THE MINING CONGRESS JOURNAL

SAFETY—EFFICIENCY—CONSERVATION

VOL. III

FEBRUARY, 1917

No. 2

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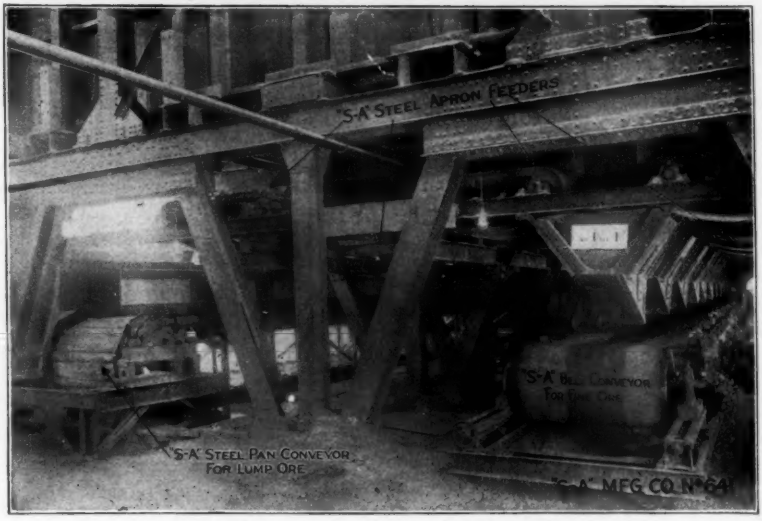

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THE MINING CONGRESS JOURNAL

Official Organ of the American Mining Congress

A NATIONAL PROBLEM

What is the problem which economists and statesmen are so frequently calling to the attention of the public as the greatest of questions to be faced immediately after the war?

The question of how to sell the products of American industry at prices which will justify the rate of wage which will be essential to provide an American living for American workmen. The question presents two problems, each of which requires solution in order to meet the situation.

1. The control of the home market for from 90 to 95 per cent of the production of American industry.

2. The control of a foreign market for from 5 to 10 per cent of our industrial productions.

After giving all due prominence to the influence of banks and money—after discussing all problems of transportation and exchange—after exhausting the subject of conservation of natural resources—after settling, as best a majority may do, the great moral questions—after stripping the verbiage from political discussion—we are left with the exceedingly simple question, "How are we to keep the American workman employed at remunerative wages?"

The satisfactory solution of this question insures good business conditions and the failure to solve it means business depression and want.

One school of economists will urge that the solution is a high protective tariff, high enough to preserve our own markets for the product of our own labor. This solution is very simple as to 90 per cent of our production. But what of the other 10 per cent which our own people cannot consume? Can we prosper when 10 per cent of our manufacturing plants are idle—when 10 per cent of our workmen are seeking employment? If it is true that we can produce 10 per cent more goods than we can consume, we must find an outlet for that surplus or else 10 per cent of our productive forces must be in idleness. Conditions might be imagined in which the earnings of this 90 per cent would be divided among the whole productive forces of the country. This would require a revolution in present-day political conditions and is practically impossible. Ten per cent of idleness means disastrous competition followed by panic and a wholesale destruction of values. This might furnish a solution. By many this is thought to be the inevitable solution; breaking down of prices of labors' product to a point so low as to command all markets. To accomplish this through efficiency would be statesmanlike; to accomplish this result by breaking down the American wage scale would be disastrous to the country and a political blunder so stupendous as to be a crime. What, then, is the remedy? The writer believes that the only permanent remedy lies in efficiency. Germany, with a territory the size of Texas, and nothing like as rich in natural resources, through the economy, industry, and efficiency of her people, came very near to being the industrial master of the world.

The United States has many thousand times more natural wealth than Germany, and with like thrift can absolutely

dominate the world's commerce. This will not and cannot be accomplished through a reduction of the efficiency of the American workman—either as compared with his own past output or with the output of his world market competitors in other lands.

The advocates of a seven-hour day—the organization which, through inefficiency, through lessening the productive services of the individual, undertakes to find work for all should, at the same time, qualify for service in the camp of starvation. Through efficiency only can we hope to sell our surplus products in foreign markets, and this is essential to the continuous and lucrative employment of all our workmen.

THE DOMINANT POLITICAL FACTOR

It would, perhaps, be a rash statement to say that the Committee on Interstate Commerce of the United States Senate is controlled and dominated by the American Federation of Labor, which in turn is controlled by Mr. Samuel Gompers, and that in consequence the demand of Mr. Gompers for something which seems to be wrong is more potent than the demand of the President of the United States for a thing which seems to be right. President Wilson has asked that Congress shall enact a bill through which "The concerted action of powerful bodies of men shall not be permitted to stop the industrial processes of the nation." In the January number of the MINING CONGRESS JOURNAL, attention was called to the fact that the first part of the President's program was approved by the labor leaders and that the second part does not meet their approval and we stated that, "It remains to be seen whether organized labor is the dominant political factor in the Government or whether Congress is ready to demonstrate the opposite by putting into effect President Wilson's suggestion." It was not then anticipated that so ready a confession would be presented as the action of the Senate Committee on Interstate Commerce in its decision not further to consider this matter seems to be. Had the matter been held under consideration, the action would not be so conclusive, but, when so important a committee shall definitely decide to pigeon-hole so important a matter, it would seem to justify our opening statement.

ECONOMY IN PAPER SHOULD NOT GO TOO FAR

While the efforts being made by Congress to effect economies in the use of paper are commendable and doubtless will have the effect of eliminating some Government publications which are of doubtful value, a too zealous prosecution of the curtailment of publications would result in serious losses to the public. The value of the paper in most Government publications is so infinitesimal, as compared with the value of the information to the public, that any step which would prevent the extent of circulation of the documents would be penny wise and pound foolish.

We are interested most directly, of course, in the publications of the Bureau of Mines and of the Geological Survey. We are very positive that the value of the publications of these two bureaus has been so well demonstrated as to preclude any thought of suspending any portion of these publications. In our opinion it would be very unwise to discontinue the free distribution of the publications which are not of such a technical nature as to be of interest only to engineers and other specialists.

It is Congress, rather than the departments, which has the reputation of being wasteful in matters of printing. We do not agree that the Congress is wasteful. It is true that some waste results from a liberal printing policy, but the losses are so small when compared with the benefits which result from a generous issue of documents affecting the public good that it hardly is worthy of consideration, especially when that consideration is taking up the time of Congress whose maintenance costs thousands of dollars an hour.

COTTRELL AN ASSET TO THE MINING INDUSTRY

That the Bureau of Mines is particularly fortunate in having at the head of its division of metallurgy so capable and so adaptable a man as Dr. F. G. Cottrell has been recognized for some time by those familiar with the personnel of the Bureau. Without question, Dr. Cottrell could command a higher salary in private employment. The fact that he is held in his present place as chief metallurgist of the Bureau of Mines by his intense interest in advancing metallurgy in a national way should bring Dr. Cottrell deserved commendation. His presence in the Government service is a decided asset to the metal mining industry.

GOVERNMENT CONFISCATION

The patriotic pride of every citizen is affected whenever he is convinced that the Government to which he owes allegiance is violating the plain intent of its agreements. The adherent to the policy "My country right or wrong," as applied to foreign governments, is not ready to justify his country in violating its implied contracts with its own citizens. The greatness of this country has been built upon the fulfilment of the nation's contracts with its pioneers who settled upon and developed that great territory not comprised in the boundaries of the thirteen original States. When the offer of the nation is accepted by a citizen and in compliance with the prescribed regulation he invests large sums of money in the development of an enterprise fraught with benefit to the community, other citizens, who know the facts, can hardly be expected to approve an effort to deprive the investor of the property which his capital and energy have created.

When the United States Government purchased the Alaskan Northern Railway for $1,150,000, one-half of the value placed upon it by its own appraisers, it might be said that the Government had driven a shrewd bargain—but when it is known that the price accepted was some millions of dollars less than had been invested in its construction and that the price was accepted under threat that the Government would parallel and thus make worthless the whole investment, the transaction takes on the atmosphere of brigandage.

Alaska will be greatly benefited by the construction of the Government Alaskan Railway, but nothing like as much as if the road had been built by private capital under the necessity of making it pay by the development of business enterprises along its route. This the Government cannot well do without giving an undue advantage to the fostered enterprises in competition with those not so assisted, as it is plain that the Government cannot well make itself a part of all business.

It is equally evident that the Government ought not to take steps in the business world calculated to injure or destroy the legitimate investment of its citizens. When the Tanana Valley Railroad was constructed it was a great benefaction to that community and has continued to be so down to the present time. It has not been a profitable investment except to the people who have been kept from freezing by fuel which could not have been supplied by any other agency. Now it is understood that the Government is proposing to parallel 31 per cent of the line of this railway at its middle section and thus practically destroy the whole investment. It is a ludicrous anomaly that Falcon Joslin, president of the Tanana Valley Railway, drew the bill providing for the Government Alaskan Railway and did more than any other one man in bringing about its enactment.

To those who believe that the government construction of railroads is a crime, Mr. Joslin's dilemma will be regarded as an example of retributive justice.

Those who appreciate the spirit of public service which inspired Mr. Joslin's work and the actual service rendered will not approve the proposal to destroy his property without making just compensation.

Surely an administration which through any means destroys the value of the legitimate investments of its citizens can

but suffer in self respect whether that investment be made in an Alaskan railway, a California oil well, or a Colorado water-power development.

GOVERNMENT PRINTING POLICY NEEDS REVISION

If it were possible to reduce to dollars and cents the losses due to delays in printing Government publications, a protest would result which would insure a change in the present system. What is a 24-hour job for a private printing establishment often requires a month at the Government printing office. The delay is so great that duplicating machines are coming into increased use in all departments.

The mining industry suffers more keenly from this cause perhaps than does any other, since the information conveyed by the Government's work often prevents extensive duplication of effort or may have an important bearing on mining operations.

Many who are familiar with the printing situation in Washington believe it could be bettered materially if private printing establishments were allowed to bid on printing in competition with the Government printing office.

A MENACE TO GOVERNMENT

At a recent hearing at the House Committee on Interstate Commerce which is considering the Adamson Bill for the investigation of industrial disputes, Mr. Samuel Gompers told the committee that if Congress should pass any law to make a strike unlawful that he, for one, could be counted upon as one who would violate it.

At the Baltimore convention of the American Federation of Labor a resolution was adopted to the effect that if certain laws should be adopted by the country which did not meet the approval of organized labor, its members would be upheld in open violation of those laws.

The United States of America is a country guaranteeing individual freedom under the constitution and in accordance with law. It is a government by the majority and minorities are expected to live up to the law. When the minority is right, it can soon induce enough of the majority to join with it to change the objectionable law. Under this form of government there seems to be no excuse for an attempt by minorities to disobey the law. If minorities are to be permitted this privilege, then our Government must fail. The temerity which prompts any individual, and particularly a leader of men, to publicly threaten a violation of any law is not only astounding, but dangerous to the liberties of the people.

A COURAGEOUS EXAMPLE

An interesting occurrence is reported from the State of Colorado where a law similar to the proposal of Mr. Adamson has been in effect for nearly two years and where a strong effort is being made by organized labor to bring about the repeal of this law by the Colorado Legislature. Shortly after the last gubernatorial election, it is reported, a delegation called upon the then governor, George A. Carlson, and said to him, in effect, "Governor Carlson, one of the important parts of the platform upon which you made your appeal for reelection was the industrial investigation act known as the Colorado Industrial Commission Law. Upon that issue you were repudiated by a majority of 30,000. What do you think of that law now?" Governor Carlson replied that he was ready to stand upon and fall with that principle of legislation. The substance of the reply was, "We do not approve the law, we do not believe it is constitutional, we propose to test it by breaking it and this by calling a strike in the northern coal fields." Governor Carlson, it is reported, called his stenographer and dictated a telegram to Mr. John P. White, the president of the United Mine Workers at Indianapolis, Ind., in words substantially as follows: "Your personal representative, Mr. Grant Hamilton, and the leader of your organization in this State, Mr. Doyle, are now in my office. They advise me that they propose to test the validity of the Colorado Industrial Commission law by ordering a strike in the northern coal fields in violation of the requirements of that law that no strike shall be declared prior to or during investigation. Do you

approve the action of your representatives?" And turning to the gentlemen present, Governor Carlson said, "If Mr. White does approve this and your order the strike as you propose, I shall have him indicted for conspiracy, and if you call this strike as you propose, I shall have you arrested immediately for conspiracy, and you gentlemen will find that there are other laws in Colorado more drastic than the Colorado Commission law and you will have to answer to those laws." It is needless to say that the strike was not called.

BY-PRODUCT COKING CAPACITY OF U. S. INCREASING RAPIDLY

By the end of 1917 the United States will have a by-product coke oven capacity which compares favorably with that of Germany prior to the war. The growth of this industry in the United States has been remarkable. In 1890 there was no coke produced in the United States in by-product ovens. In 1893, the production was 12,850 tons. This jumped to 1,000,000 tons in 1900 and to 11,000,000 tons in 1912. From 1912 to the beginning of 1915 there was no particular increase, but in 1915 and in 1916 the industry increased with rapid strides to a total of nearly 20,000,000 tons.

Important centers of the by-product coke industry have been established at Indiana Harbor, Duluth, St. Louis, Cleveland, Johnstown, South Bethlehem, Youngstown and Toledo. At many other places the industry is assuming important proportions. At the end of 1917 the United States will have capacity for turning out in excess of 400,000 tons of ammonium sulphate from by-product coke. When it is considered that the German capacity in 1913 was barely 500,000 tons a better idea is secured of the importance this industry has assumed in the United States. Of course, the German capacity has been greatly increased since the opening of the war.

"HOLE IN THE DOUGHNUT" ATTRACTS MUCH ATTENTION

Considerable attention has been attracted in Washington to a clever publication by the Franklin County Coal Operators' Association, entitled, "The Hole in the Doughnut." The publication consists of a single sheet on which appears a realistic likeness of a homemade doughnut. The larger part of the doughnut is marked off to show the proportion of the selling price of coal which goes to labor. The remaining smaller portion of the doughnut is divided in the exact proportions represented by supplies and material, sales expense, taxes and insurance, general expense and association assessments.

Then comes even a more clever part of the figure. The hole in the doughnut is divided into sections showing profit, plant depreciation, land depletion, contingent fund and interest on investment. The only comment which appears on the sheet is the following, "Some operators do not make money through failure to include all necessary items in determining proper sale price."

STANDARDIZATION OF MINE STATISTICS BEING SOUGHT

Many problems have been presented to the committee on the standardization of mining statistics, which is working in cooperation with the Bureau of Mines. Some objection has been made to the inclusion of metal mining statistics in the report of this committee. It is declared that the metal mining interests were not presented at the meeting of mining inspectors at which the discussion took place with regard to uniform statistics.

Objection has been made to the refinement of statistics to such a point as to tax the patience of the operators who are called upon for the information. The elimination of all but essential questions is urged.

Standardization of questions is more to be desired, C. E. Lesher, the statistician of the Geological Survey, says, rather than an effort to secure all information for the different bureaus of the Government service through one inquiry. If the questions are standardized, he argues, mine operators will be able to keep their records so as to furnish the information readily. Whether they are called upon to fill in the same information on two or three separate inquiry cards is a matter of slight inconvenience. He favors the continuance of separate inquiries by the different bureaus.

BANKS REFLECT PROSPERITY OF ANTHRACITE REGION

Statistics compiled by the Anthracite Bureau of Information at Wilkes-Barre, from reports received through the courtesy of fifty-six banks distributed among the nine principal cities of the anthracite region, show an increase in deposits in one year—from November, 1915, to November, 1916—of 14 per cent, or from $108,705,812 to $124,022,303.

In considering these statistics it should be remembered that although by far the greater part of the bank deposits in the anthracite region flows originally from the payrolls of the anthracite mining companies which distribute annually some $150,000,000 in wages, the bank deposits are not unduly swelled by the accounts of the larger mining companies whose chief balances are kept in New York and Philadelphia. The regional bank deposits are for the most part maintained by the local industries, tradesmen, and the wage earners, no insignificant proportion being represented by savings deposits of mine workers.

There are only two establishments in the anthracite region that manufacture munitions of war and the region does not directly benefit to any great extent from the war in Europe. The figures here shown may consequently be taken as indicative of a healthful condition of trade and employment throughout the entire community.

REVENUE BILL SMACKS STRONGLY OF CLASS LEGISLATION, MANY CONTEND

Despite Fact that Mining Industry Will Pay Large Portion of New Tax if Bill Becomes Law it is Less Objectionable than Tax on Certain Mineral Products, it is Believed

While there is a general feeling among Senators and Representatives from the mining states that the revenue bill which will be introduced shortly, smacks strongly of class legislation and that the mining industry will be called upon to pay a large portion of the revenue which will be raised, there is no evidence thus far (January 23), that the bill will be opposed by the Democratic members from mining states.

The proposal to raise revenue from profits exceeding 8 per cent will fall heavily on the mining industry, all admit, but in view of the fact that it applies to profits in other lines of endeavor and in no way singles out the mining industry, the disposition, apparently, of the mining industry is to allow the proposed bill to take its course While the present bill is not at all pleasing to most of the representatives of the mining states they regard it as a great deal better than a measure singling out certain mineral products for taxation. There was a general feeling of relief when it became apparent that it would not be necessary to fight again to keep the committee from singling out copper and a few other metals for taxation.

Great interest is surrounding the consideration of the administration's railroad legislation. The Senate Committee on Interstate Commerce voted seven to three to exclude the provision prohibiting strikes pending investigation. Hearings still are in progress before the House Committee on Interstate and Foreign Commerce, but indications point that this committee, as well, will vote against the provision restricting the right to strike.

The oil land leasing bill probably will have to fight for a place on the Senate calendar. It is not scheduled to be included in the majority party's program, but it is possible that it has sufficient ardent supporters to force it before the Senate.

Since all bills die on March 4, which is the end of the session, and as there is no chance of considering any but the more important measures in the few weeks remaining, no new bills of interest to miners have been introduced.

Senator Phelan presented in the Senate a statement of members of the California delegation in Congress in regard to the leasing bill and the naval oil reserves. The statement is signed by Senators Works and Phelan and Representatives Church, Kahn, Curry, Kettner, Raker, Hayes and Elston.

The principal points of the statment are summarized as follows:

"1. Up to March 1, 1916, there had been withdrawn from entry in the western States 5,603,295 acres of oil lands.

"2. When President Taft, in 1909, issued an order withdrawing over 1,000,000 acres of land in California 95 per cent of the California claimants had already entered upon it under the mining laws and initiated their claims. In December, 1912, after millions of dollars had been expended and valuable properties created, naval reserve No. 2, covering a portion of the land withdrawn, was established.

SAYS WHOLE NATION SUFFERS

"3. The whole country suffers from the diminishing of the oil production on the Pacific coast, which has resulted from the government suits to cancel these claims and from the insistence of the Navy in denying relief to the claimants. The diminished production in California has resulted in an increase in the price of gasoline and all petroleum products. For this reason the question involved in the pending bill with its relief provisions for the California oil producers is not a local one, but one which affects the entire country.

"4. The assumption of the Navy that it needs the oil in reserve No. 2 is unfounded. This reserve cannot be used to store oil for future use of the Navy because there are already more than 200 wells drilled within its limits. The Bureau of Mines estimates that these wells have already drained this reserve of one-third of its entire content.

ABUNDANCE OF OIL AVAILABLE

"5. There is an abundance of oil available for the Navy which it can secure from publicly owned lands without taking the wells drilled and owned by private citizens, the oil from which is being used in the industries of the country. Naval Reserve No. 1 is estimated to contain 100,000,000 barrels. Naval reserve No. 3 has 30,000,000 barrels. Naval reserve No. 4, created in December, 1916, is estimated by the Geological Survey to contain 1,000,000,000 barrels. The Government also owns 3,200,000 acres of withdrawn petroleum lands, from which it can create other reserves containing many millions of barrels more."

A CARTOONIST'S CONCEPTION OF HENRY MACE PAYNE

MORE SILVER MINED BUT LESS REFINED IN 1916 THAN IN 1915

The decrease of silver production during 1916 is attributed largely to the fact that a considerable quantity of ore mined during the year was not treated. Judging from the quantity of ore mined, there should have been a considerable increase of silver production for the year. The compilation of the reports from the refiners, made to the Bureau of Mint, shows clearly that there was an actual decrease over the production of 1915. In some cases it develops that the smelters were not able to obtain as large supplies of ores and concentrates as they could have handled, owing to the car shortage. In some other cases treatment plants are considerably behind their receipts of ore.

CURTAILMENT OF PUBLICATIONS IS SUGGESTED BY CONGRESS

In an effort to reduce the consumption of paper the Senate has called upon the departments to advise if it is possible to discontinue some publications and effect other economies in the use of paper. In turn, the secretaries of the departments have inquired of the heads of each bureau as to the possibilities of using less paper. In regard to the Geological Survey and the Bureau of Mines, it is regarded as certain that they cannot discontinue any of their publications without entailing a loss to the public greatly in excess of the cost of the paper on which its bulletins are printed.

The Geological Survey, in 1916, went too far in an effort to economize in the matter of printing. As a result of limited editions of publications, public demand was such that it was necessary to have reprints made of thirty-four publications. The Bureau of Mines has been contending since its organization with an inadequate printing fund. This fund has been so small as to limit very greatly the service that it has been able to perform in certain lines of investigation.

In connection with the Senate resolution, it has been suggested that the free distribution of Government publications be discontinued. Such a proposal meets with the determined disapproval of practically all persons in touch with the situation. If all publications on matters relating to the mining industry were to be placed on sale, it would be no bar to their circulation among the more highly organized companies and among engineers but the prospectors, small operators and the less organized companies in all probability would not receive these helpful publications. The principal idea of Government service is that it must be conducted in the interest of the whole public and not in the interest of a few.

Again, it is necessary for the Geological Survey and the Bureau of Mines to rely upon operators for a great deal of information regarding production and in the collection of other facts regarding mining operations. After being deeply indebted to the operators for necessary information, it would not be following out the spirit of cooperation if publications were not sent gratis to those who assisted in making them possible.

STANDARD ACCOUNTING SYSTEM GREATLY NEEDED

"Any study of costs in the coal industry finds its point in the question not who but what fixes the price of coal. The cost of mining coal, like the cost of living, is increasing. Exact mining costs, however, cannot be determined until the operators have accomplished their reform of standardizing accounting." (Extract from the address of Geo. Otis Smith at the Mining Congress Convention.)

FELLOWSHIPS IN METALLURGY DESIRED BY MANY SCHOOLS

Establishment of fellowships in metallurgy by cooperative arrangements between the University of Washington and the Bureau of Mines is likely to develop in the near future. The success of the fellowships, which were established by the University of Utah in cooperation with the Bureau of Mines at Salt Lake City, has called wide attention to the advantages to be gained by this procedure. As a result the Bureau of Mines is in receipt of inquiries from several schools located at points where the Bureau of Mines maintains branches or experiment stations.

The Bureau of Mines is anxious to extend this facility as it gives an opportunity to train metallurgists along the line of its work. These metallurgists on entering private employ carry with them the high standards which characterize the Government's service. In a lesser degree good is resulting to the Bureau in making available young men from which the Bureau may draw competent specialists.

INVESTIGATIONS OF PRODUCER GAS PLANTS IS ADVISED

While considerable indefiniteness exists regarding many of the operating details of producer gas plants, it is believed by specialists at the Bureau of Mines that this form of power production merits investigation.

R. H. Fernald is the author of a bulletin just published by the Bureau of Mines in which he calls attention to the strong opposition which the producer gas plant has met from steam-plant operators. It is his opinion that these operators see possibilities of being forced to renovate their entire plants, which would result, if it were necessary to replace the steam boiler with the producer unit. Mr. Fernald states that the producer gas plant occupies a strong position at small central stations and many isolated plants, but that large units of the producer type have not materialized, largely because of the opposition mentioned.

IMPORTANCE OF RATE ADJUSTMENT POINTED OUT

"The same reasons that call for uniformity in mining legislation, with greater force cry for an equality in the relationship of the coal freight rate adjustments between the various competing fields.

"Into the web and woof of its competitive industrial garment three basic strands are interwoven; omit or weaken either of these and the garment is 'shoddyized.' These three are wage-scale, legislative regulations and freight rate adjustments, and the latter is not the least of these."—(Extract from the Mining Congress Convention paper of R. W. Ropiequet, at the Nineteenth Annual Convention of the American Mining Congress.)

HESS TELLS HOW TUNGSTEN VEINS ARE IDENTIFIED

In response to an inquiry concerning the identification of tungsten veins, Frank L. Hess, of the U. S. Geological Survey, states:

"The outcrops of tungsten deposits can ordinarily be identified only by the occurrence of the mineral in the outcrop, except in localities where veins are known to carry tungsten minerals. If sulphides are present sulphuric acid is formed by the action of moisture and air upon them, though of course in very dilute solution. The sulphuric acid attacks the tungsten minerals and destroys them. Wolframite may leave hydrous iron oxide in the cavities occupied by the wolframite which may show traces of a cleavage similar to that of wolframite, and iron oxide with such a cleavage may be taken to indicate the former existence of tungsten minerals in the exposed part of the vein and their probable presence in the unexposed parts. Scheelite leaves cavities, some of which may contain a little golden yellow tungstite, the hydrous tungsten oxide. Tungstite may also be left after the decomposition of the wolframites."

To Write Report on Phosphate

W. C. Phalen, who recently was transferred from the Geological Survey to the Bureau of Mines, has been re-transferred to the Survey for a period of three months that he may prepare a report on the Kentucky phosphate field. The field work for this report was done by Mr. Phalen under a cooperative agreement between the United States Geological Survey and the Kentucky Geological Survey. Mr. Phalen regards the possibilities of the Kentucky field as very promising.

Akron the "Rubber Capital"

The position of Akron, Ohio, as the "Rubber Capital of the World" has been so well established in the public mind that it is doubtful whether any one would question seriously the claims of the rapidly growing Buckeye City to the distinction it has won. A recent valuation of Akron industries for property taxation, completed by the auditing department of the county in which the city is located, brings out with striking clearness the predominance of the rubber manufacturing industry over any other of the many that have brought about an increase of approximately 300 per cent in the population of Akron during the past ten years.

The taxable value of the great plant of the B. F. Goodrich Co. alone amounts to almost half of the total of $43,896,440 placed upon the 168 industries located in Akron and Summit County. When it is remembered that included in these 168 industries are such concerns as the Diamond Match Co. and the Quaker Oats Co., it is possible to get an idea of the immensity of the Goodrich Co.'s establishment.

DEPARTMENT OF LABOR PROPOSES ABSORPTION OF BUREAU OF MINES

Such Action Would Put an End to Cooperation With Mine Operators, According to the Opinion of Persons Well Advised—Scientific Work of Bureau Depends on Cooperation with Operators.

After the failure of several legislative plans to transfer the Bureau of Mines from the Department of the Interior to the Department of Labor, a more pretentious effort to accomplish this purpose has been launched. The Secretary of Labor, in a letter to the Speaker of the House of Representatives, makes certain recommendations along this line. Along with the Bureau of Mines, the Secretary of Labor proposes that his department be given jurisdiction over all, or a part, of the work at present being done by the Public Health Service, the Office of Markets and Rural Organization, Steamboat Inspection Service, the Bureau of Navigation, the Interstate Commerce Commission and the Board of Mediation and Conciliation.

With the influence of a Cabinet officer behind such a proposal, it is expected that an active effort to this end will be made. Many friends of the Bureau of Mines are very much opposed to this action. They feel that operators of mines will not be willing to cooperate, at least to the same extent, in the work of the Bureau if it becomes a part of the Department of Labor. There is no hostility on the part of mine operators toward the Department of Labor, it is generally believed here, but operators and employers generally regard the Department as being primarily and above all in the interest of the employes. To bear this out is the declaration of Secretary Wilson himself. With regard to administering his Department he says: "I have regarded it as contemplating a development of diplomatic duty with reference to labor disputes analogous to those of the Department of State with reference to national controversies. As it is the duty of the Department of State to represent our nation with fairness toward all other nations, so it is the duty of the Department of Labor to represent wage-earning interests with fairness toward all other industrial interests."

Despite the fact that the suspicion is probably unjust, many employers are of the impression that the Department of Labor is not averse to furthering movements looking to special privileges for labor organizations. For this reason it is regarded as highly probable that they will refuse to open their records and entrust their business secrets to a bureau in the Department of Labor. As the success of most scientific and technical work conducted by the Government depends on an intimate degree of cooperation with employers, a very important feature of the work of the Bureau of Mines practically would be nullified if the action should be taken which is recommended by the Secretary of Labor.

In the organic act establishing the Department of Labor, its duties are prescribed as being, "To foster, promote and develop the welfare of the wage earners of the United States." That it is very necessary to carry out such duties to a large portion of the population apparently is generally admitted, and employers are in accord with plans looking to the welfare of their employes. There are few of them, however, who wish to combine with such work the scientific investigations being done in the interest of the mining industry by the Government.

MINING ENGINEERS TO MEET IN NEW YORK FEBRUARY 19-22

The American Institute of Mining Engineers will hold its one-hundred-and-fourteenth meeting in New York City, February 19, 20, 22. They are expecting an attendance of over 500, and some very important questions are to be discussed.

Among the leading papers which will be presented are: (1) "Recent Geologic Developments on the Mesabi Iron Range, Minnesota," by F. F. Wolff; (2) "Grain Growth Phenomena in Metals," by Henry M. Howe and Zay Jeffries; (3) "Evidence of the Oklahoma Oil Fields on the Anticlinal Theory," by Dorsey Hager; (4) "Magnetic Concentration of Low-Grade Magnetic Iron Ore," by S. N. Norton; (5) "The Conservation of Phosphate Rock in the United States," by W. C. Phalen; (6) "Potash as a By-Product from the Blast Furnace," by R. J. Wysor; (7) "Significance of Manganese in American Steel Metallurgy," by F. H. Willcox.

COAL AND COKE ESTIMATE EXCITES GENERAL INTEREST

Decided interest has been shown at the Bureau of Mines in the recent press bulletin issued by the Geological Survey which estimates the production and reviews many features of the coal and coke industries in 1916. The Bureau of Mines is enlarging upon certain features of this report which are of especial interest in connection with work it is doing. From the figures given by C. E. Lesher, the statistician of the Geological Survey, the Bureau of Mines, among other things, has been able to calculate the amount of toluol produced during 1916 and to make other interesting deductions.

"COST OF COAL" PAPER COMES IN FOR EDITORIAL COMMENT

In discussing the Mining Congress Convention paper of Geo Otis Smith and C. E. Lesher, director and statistician, respectively, of the Geological Survey, the Review of Reviews in its January issue says:

"The advanced cost of coal during the autumn and early winter has been brought home with force to householders as well as to many industrial interests. So serious has been this increase that as a result of universal complaints and protests there have been various official investigations and remedial steps proposed to deal with the high cost of fuel.

"Few of these investigations and discussions have been entirely free from prejudice or have taken into consideration the fundamental economic facts connected with the ownership of the mines, and the mining, transportation, and distribution of coal. Accordingly a paper on the subject presented to the American Mining Congress at Chicago on November 14, 1916, by Director George Otis Smith and C. E. Lesher of the United States Geological Survey, and reprinted in Science and other scientific journals, is particularly welcome, as it supplies the fundamental facts on which any present or future plans for government control or operation or ownership must be based. Such facts, it is unnecessary to say, seldom appear in popular or political discussions, even if they are known, which may be disputed.

"In the coal industry the first cost or mining cost represents the value given to a ton of coal by the mine operator and mine worker, including the expenditure for wages, supplies and power, the operator's selling costs and his overhead expenses, and the original or resource cost—the royalty or depletion charge—and the profit or loss on the sale. These elements vary greatly between districts, and even between mines of the same owners in the same district. According to the paper, 'It is not practicable to assign a very exact figure to the mining cost—the census of 1909 indicated an average of $1 a ton for bituminous coal and $1.86 for anthracite, but these figures are believed by some operators to be too low. It is possible, however, to show in a general way the distribution of this item: the cost of mining is divided between labor, 70 to 75 per cent; materials 16 to 20 per cent, general expense at mine and office and insurance, 2 to 4 per cent; taxes, less than 1 per cent to 3 per cent for bituminous coal, and 3 to 7 per cent for anthracite; selling expense, nothing to 5 per cent; and recently to these items has been added the direct and indirect cost of workman's compensation, which may reach 5 per cent for bituminous coal.'

"Now the cost of selling coal must be considered, for it may be little or nothing for some producers who sell to themselves or direct to the railways, or it may be as much as 15 cents a ton for prepared sizes of anthracite. But the important element is the transportation charge, which varies naturally with the length of haul.

"In the interstate traffic, both rail and water, bituminous coal probably pays an average freight of nearly $2 per ton. In other words, the transportation costs more than the product and, as some parts of the country are just now learning, is more difficult to obtain. The value of coal, like the value of so many other commodities, is a place value. The average freight charge on anthracite is higher than that on bituminous coal; first, because the rates are higher, and, second, because, according to the reports of the Interstate Commerce Commission, all movement considered, the coal is carried a greater distance.

"Then comes the marketing cost. The commissions of brokers, shrinkage, and deterioration all figure, and finally there is the large cost of retailing.

"About half of the anthracite and around 15 per cent of the bituminous coal is retailed in less than carload lots, and the greatest number of individuals are directly concerned in the marketing of this portion, regarding the profits on which there is the widest divergence of opinion. The margin in the retail business between cost on cars and price delivered is between $1.25 and $2 a ton and is not more than enough to give on the average a fair profit. The shrinkage and, in part, the deterioration are together seldom less than 1 per cent of the weight and may exceed 4 per cent, and the retail dealer also must provide in his selling price for uncollectible accounts. Advertising is a large expense—in part carried by the retailer directly, but all borne by the industry. The largest single item in the cost of retailing is, of course, that representing the labor of handling and the local cartage, which together make up about half the marketing cost.

"With all these various costs discussed and analyzed, there remains to be considered a primary one, namely, the resource cost or the cost to the operator of the coal in the ground, usually expressed as a royalty or depletion charge.

"The present average rate of royalty on anthracite is probably between 32 and 35 cents a ton on all sizes, which is from 12 to 14 per cent of the selling value at the mine. The minimum rate (about 10 per cent) is found in some old leases, and the maximum (20 to 27 per cent) in leases made in the last five years. R. V. Norris states that in the late sixties, when the annual output of anthracite was around 15,000,000 tons, royalties were 8 to 10 cents a ton on prepared sizes, but that no charge was made on the smaller sizes. In the seventies the rate rose to 25 cents on prepared, one-half that on pea, and one-fourth on smaller sizes.

"Striking a balance between labor's share and capital's return, it would be found that 'the mine worker, the trainman, and wagon driver together receive fully half of the price of the anthracite delivered at your house, and the same three classes of labor receive not less than half the price paid by the average consumer for the cheaper soft coal. In a similar manner the average return on the capital invested in land, mining plant, railroads and coal yard may be roughly calculated with the result that landlord, bondholder and stockholder of coal company and railroad together receive about $1.15 from the ton of anthracite and only 50 to 75 cents from the ton of bituminous coal, and of either of these amounts the mine operator's share is only a small fraction.'

"There seems to be little hope of reducing costs in mining methods or wages, but the most promising source of relief seems to lie in reducing transportation charges through a shortened length of haul.

"Though many a consumer's preference for coal from a distant field over that from a field nearer home is based on special requirements, the deciding element in the preference of other consumers is simply the price, and this, in

turn, may be largely due to a differential freight scale, which is thus not in the public interest, if we admit the premise that it is wasteful to burn coal in hauling coal into coal districts or past such districts, except in so far as quality requirements absolutely demand the long-haul coal. The recent eastward movement of the higher-grade coals, in part caused by the export demand, may involve some increase in the average length of haul, and thus in the transportation cost of coal not reported; but on the other hand, this enforced adjustment may lead some consumers to discover nearer-home sources of coal equally well suited to their purposes. Reduction in marketing costs is a reform so close to the consumer that he should be able to find for himself whatever relief is possible. Professor Mead, of the University of Pennsylvania, is authority for the statement that the delivery of coal is costing the dealers 50 cents a ton more than is necessary.

"The paper suggests that 'The burden that seems evitable under unregulated private ownership of a natural resource like coal is that because the lands containing these national reserves of heat and power are taxed and because the individual or corporation properly charges up interest at current rates on his large holding, the consumer must pay a resource cost which takes into account the long period of undevelopment.'

"The conclusion is drawn that 'as coal is more an interstate than intrastate commodity, any regulation of prices needs to be under Federal control, and to benefit both consumer and producer such control cannot stop with transportation and mining costs, but must stand ready to exercise full rights as a trustee of the people over the coal in the ground. . . . Public regulation, however, will be fair and indeed in the long run will prove beneficial to the landowner as well as to the consumer, to the mine worker as well as the operator, because any such agency as the Federal Trade Commission, in its control of prices, must determine costs; and as we interpret the present attitude of the whole coal-mining industry the operators are willing to rest their case on a fair determination of actual costs on which their profits may then be figured.' "

TOPOGRAPHIC MAP NECESSARY IN SCIENTIFIC SEARCH FOR OIL

For an examination with the object of ascertaining whether the geological conditions are favorable for the occurrence of oil or gas in commercial quantities, so far as this question is determinable from purely geologic criteria, it is desirable, in the first place, to have an accurate topographic base map on a scale of an inch or more to the mile, on which the elevations or altitudes above sea level of a considerable number of points have been accurately registered according to Geo. Otis Smith, director of the Geological Survey.

Such topographic base maps not only facilitate the geologic investigation but they contribute to its economy and the precision of the results. Without such a map it is necessary for the geologist to do plane tabling, with determination of a great number of elevations, with consequent increase in the time and cost requisite to the work, Dr. Smith points out. Discussing the matter further, Dr. Smith says:

"The work of the geologist consists in the examination and identification of the geologic formations exposed in the region, for the purpose of ascertaining whether they are of the age and general character of formations which are known to carry oil or gas in commercial amounts in the general region or in other parts of the country.

"Conditions being found favorable in this respect, the next step in the investigation is to make a detailed examination of the structure or altitude of the beds in the search for folds, embracing, in particular, anticlines and domes, these being upward folds, of sufficient distinctness and area and so located with regard to the broad structure of the region or basin as to favor the segregation of disseminated oil and gas into pools, which usually are found within these upward folds. In many regions this structure, which is so important in making locations for tests, cannot be determined by the geologist from mere surface criteria, for reasons that the bed rocks of the area may be completely or very largely masked by losses or glacial drift or alluvial deposits, or because the outcrops of bedrock, if they are sufficiently numerous, lack recognizable key rocks for the identification of definite horizons and the determination of their stratigraphic relations in sufficient number and exposures to permit the recognition of the configuration of the various strata. Sometimes the altitude of the beds cannot be detected until the records of numerous wildcat-drill holes are available for study, together with the criteria afforded by the expanse of bed-rock.

"It is further important that the geologist ascertain, if possible, whether the formations within reach of the drill in the region under examination probably contain suitable storage reservoirs for oil and gas—namely, porous sandstone or limestone interbedded with other strata including impervious beds which will prevent the leakage and waste of the hydrocarbons. These reservoirs must be deep enough below the surface so that the oil and gas will not have escaped, and not so deep that they cannot be reached by the drill. It is desirable that the geologist should also be careful to ascertain whether these sands are equivalent to or comparable to the sands containing oil or gas in productive regions, and whether they are associated in the formations with rocks whose composition is propitious for the generation of oil and gas.

"All these questions should, whenever possible, be determined in advance of selecting a location for boring, for while it is true that the drill is, after all, the only reliable test as to whether oil or gas may be present in commercial amounts in a region, these valuable mineral deposits, if they are present at all, are in most cases to be found only in the anticlines, domes, or other favorable structures; and since these structures occupy only a small proportion of any extended area the chances for loss or sheer waste of the investment are multiplied if the locations are not chosen, so far as possible, with reference to favorable structures."

WEST SHOULD MAKE INFLUENCE FELT AT CAPITAL, DECLARES STUDENT OF CONSERVATION

Geo. H. Patrick contributes the following presentation of views concerning the conservation question:

"The coal and oil lands east of the Mississippi are, and always have been, held in private ownership, for the profit, primarily, of the owner; but next, and to a far greater extent, benefiting the States in which located, through the use of the mined product in manufactures and other industries, and the tax revenues derived therefrom, directly and indirectly, without which the governments of those States could not be supported.

"In the whole west the title to the coal and oil lands, with a few exceptions passed to patent, remained in the Government, supporting no industry, producing no revenue to State or county, a hindrance rather than a help to the development of the States made out of these same lands, and because of them.

"No reason exists why these western lands should contribute to support the eastern States, any more than that the eastern coal and oil lands should pay all their net revenues into the Federal treasury to lessen the expenses of western State governments, although one is as fair as the other; but the East is not satisfied with enforcing this tribute, it insists that no western mineral lands shall be privately owned or operated, and that none of the natural resources of the West shall be used at all by or for the people of the States in which located; although the East is exhausting and selling at its own price, all its own mineral deposits of every character. The East is getting away with it, too, and, singularly enough, masquerading as a conserver of the resources of the nation. The casual onlooker is unable to discover why a ton of coal, or a barrel of oil, taken from eastern lands does not, to that extent, exhaust the national resources as much as if taken from western lands; but no one says anything about that.

"It seems to me that this is the West's fault, and that it is time to sit up and take notice. The West had no trouble, this fall, to elect the President of its choice, and generally, its legislators, not always of the same party, by a little very simple team-work. Playing without signals, it made a touch-down at whichever goal it aimed. Why does not the West play the game all the time, as well as one day in every four years? Why does it not say to its representatives, 'remember that whoso provideth not for his own household is worse than an infidel," and demand the team work that will stop this costly discrimination with a jolt.'"

Dr. Henry S. Drinker, of Lehigh University, Bethlehem, Pa., was a recent visitor in Washington.

MINING IS BEING REDUCED TO MANUFACTURING BASIS

"It is a far cry from the small and uncertain mining efforts of fifty years ago to the splendidly equipped and solidly financed organizations that now handle thousands of tons of ore per day," says Bulletin 107, just issued by the Bureau of Mines. "The old mining was largely speculative," continues the bulletin, "the new is practically on a manufacturing basis. In the old days of mining the aim was, chiefly, to find comparatively rich ore; modern practice looks more toward efficiency in mining and milling, so that vast tonnages of low-grade material may be worked at a profit. The old operators had faith and hoped for good returns; the new ascertain with a fair degree of precision what the available tonnage is, what the cost of mining and treating the ore will be, the time necessary to exhaust the deposit, the capital required, and the net profits to be made. The old mining was financed on a highly speculative basis, and the value of mining stock was largely controlled by the imaginations of the promoters and of the individual holders. In the new regime the financing of mines is often as conservative as the financing of manufactures or railroads, and the value of stock, quoted on the leading exchanges, is controlled by the carefully estimated profits in sight. Of course, with every legitimate industrial enterprise go certain business risks, and mining is not exempt from these. Then, too, valueless mining as well as valueless industrial stocks are sometimes offered for sale by the intentionally dishonest, or the ignorant. However, the prospective purchaser of a mine nowadays, if he is willing to pay for the services of reputable mining engineers, can obtain information on which to base an opinion as to the quality of his investment."

WILL PRODUCE 350,000 TONS OF COMBINED NITROGEN DURING 1917

Only by the most skillful use of the best methods in the United States can it be hoped to produce nitrates in competition with Chilean saltpeter. This is the opinion of specialists here who are studying the problem. It is understood that Germany will produce this year 350,000 tons of combined nitrogen, which is equivalent to more than 1,600,000 tons of ammonium sulphate or 2,000,000 tons of Chile saltpeter. This tremendous increase in production has so reduced the cost in Germany as to make it possible to produce it at less cost than Chilean saltpeter can be laid down in Germany. The difference in freight rates between Chile and Germany as compared to those from Chile to the consuming centers in the United States is not great. The cost of labor, however, makes it impossible for the United States to produce nitrates synthetically as cheap as they can be made in Germany unless under almost ideal conditions.

GOVERNMENT EXPERTS WELL KNOWN TO MINING MEN

CHARLES W. HENDERSON

In charge of the Denver office of the United States Geological Survey

ANTHRACITE BUREAU GETTING OUT INTERESTING BULLETINS

Very interesting and instructive bulletins are being issued frequently by the Anthracite Bureau of Information, at Wilkes-Barre, Pa. This bureau is under the capable direction of Dr. Edward W. Parker, formerly statistician of the Geological Survey. In a recent bulletin he points out the interest that is being displayed in the mining institutes for mine workers, which are growing up in the anthracite field. In connection with these institutes, evening schools have been established. A portion of this bulletin is as follows:

"All classes of occupation in and about the mines are represented in the membership of these institutes. The higher officials of the various companies are the patrons of the organizations, and the directors are selected from the heads of the operating departments. During the fall and winter, monthly meetings are held at which men trained in practical mining, or having technical knowledge of some phase of the industry, contribute papers or give talks of an educational character.

"The best index of the interest displayed in these gatherings is the average attendance of 462 at the sessions in one town last year. Four institutes alone had a total membership for the season of more than 3,200.

"But the most important function of the institutes has been developed through the members acting as 'the big brothers' to the less fortunate of their co-workers, who have been encouraged to join the evening schools. The members of one institute had the distinction of watching the evening classes with paternal eyes until last year they saw 1,800 students enrolled. In the preceding three years, sixty-eight pupils of these classes had successfully passed the State examination for mine foreman. Of these, twenty-five are in line for promotion and the other forty-three are already at better-paying positions, earning an aggregate of 40 per cent more wages. And one graduate of these schools has been able to qualify as an inspector of mines—one of the most cherished posts of honor and emolument to which the mine-worker aspires."

SOLUBLE POTASH SALTS SAVED AT CEMENT PLANT

A study of the electrical precipitation of dust containing soluble potash salts, which is in operation at the plant of the Security Lime & Cement Co., at Hagerstown, Md., was made recently by Dr. F. G. Cottrell, E. F. Burchard, amd W. C. Phalen. Dr. Cottrell is the chief metallurgist of the Bureau of Mines, Mr. Burchard is in charge of the division of the Geological Survey, and Mr. Phalen is connected with the division of mining technology of the Bureau of Mines.

In commenting on the visit, Mr. Phalen declared that the work being done by the Security Co. is a most excellent illustration of the conservation of a most valuable product which is going to waste in most plants. The conservation of flue dust at cement plants and blast furnaces is one of the most promising means for securing a supply in this country of potash salts sufficient for our domestic requirements, Mr. Phalen believes.

RATE ADJUSTMENTS HINDERED BY INTERNAL DIVISIONS

"If the coal industry is ever to have a freight rate adjustment based upon any fair and reasonable degree of uniformity and relativity, it must have a broader vision, less of petty division, and more coordination and union of efforts, less of passion, and more of reason, less dependence upon fortuitous chance and more upon the principles of true business."—(Extract from the Mining Congress Convention paper of R. W. Ropiequet at the Mining Congress Convention at Chicago.)

ALASKA LOSES BY PINCHOT BLUNDER, SAYS EDITORIAL

"The Alaskan Empire, published at Juneau, and some other papers in the northern territory, voice some concern over the fact that few applicants for leases covering coal lands have been received, and the Post-Intelligencer, of Seattle, in one of its usual dignified editorials refers to the subject at some length. The Seattle paper shows that with a production of copper approximately $40,000,000 this year, there is a demand for Alaska smelters, and goes on to show the Government has made a mistake as to the proper procedure to adopt for the encouragement of coal leases, it should remedy the difficulty without delay," says the Seattle Railway and Marine News.

"This brings up an interesting point, interesting as the fact that the Gifford Pinchot Forest Reserves, containing 'seventy-two billion feet of marketable lumber,' are not being fully utilized for the furnishing of lumber for the great railroad system the Government is building through the Chugach Forest Reserve, but quite to the contrary, lumber to the value of over $1,000,000 has been shipped from the United States to Alaska during the year just ended, and this total does not include doors, sash, blinds, furniture and all other manufactures of lumber.

"Returning to the question of the coal situation in Alaska, the largest users of fuel are steamships, mines, railroads and river boats, and all of these companies now and for some time past have been using California oil for fuel. At such time as a coal mining operator can arrange to deliver a ton of coal at tidewater ports at the rate to equal rate for a ton of coal, in barrels of oil, then some change might be expected to take place in the situation.

"It all reverts to the question of Alaska's resources withdrawn from development, brought about by Pinchot, and the present situation must exist until such time as the United States Government admits the error of the past in full and makes it possible for the only parties interested in utilizing those natural resources, to acquire same on a safe, sane and sound business policy.

"There is nothing the matter with Alaska. Its future is assured, but it must always be remembered that those who were ruthlessly and unfairly prohibited from enjoying to the slightest degree certain natural resources of that country are now able to produce other resources and to prosecute their work in the most successful manner through the aid of California oil, and today California oil holds the key to the industrial situation in the splendid territory of the north.

"California oil is going to help make a total of commerce for 1917 even exceeding that of 1916. There is no getting away from the cold fact that no citizen, group of citizens or corporation would attempt to open any Alaska coal field on a big scale, when 90 per cent of the users of fuel are going to stand by California oil.

"It is worthy of careful thought. Far be it for us to utter the old cry 'I told you so,' but every tank ship loaded with oil moving to Alaska and every shipload of lumber, and many of them will move in the years to come, will be proof positive of the truth of every statement made in the anti-conservation press to the effect that Pinchot and his followers made the most lamentable blunder and the country suffers in consequence."

NEW OIL SHALE RESERVES DISCUSSED BY SECRETARY

"The most important single act during December in connection with the classification of mineral lands was the creation of two naval oil shale reserves, one of 45,440 acres in western Colorado, and one of 86,584 acres in northeastern Utah," says a statement from the office of the Secretary of the Interior. Continuing, it says: "The lands thus set apart for the use of the Navy contain bodies of shale which, when mined and distilled in properly constructed retorts, yield oil of good quality. Thus far oil has not been extracted from shale in the United States in commercial quantities, since the discovery of crude oil developed by wells, because oil can be secured in the latter way much more cheaply than through the more complex process of extracting it from shales. But the oil shale industry has existed in Scotland for half a century in spite of the competition of the oil fields of the world, and the time will doubtless come when the large oil shale deposits of western United States will also be developed in a commercial way.

"These naval oil shale reserves have been created to provide for the needs of the Navy during that future time when the ordinary oil fields have been so reduced that it becomes practicable and profitable to distill the more expensive shale oils. No other important reservations were created during the month and no extensive restorations were effected."

HIGH PRICES MAKE POSSIBLE INCREASED RECOVERY OF COAL

"It must be remembered that conservation of a natural resource though it undoubtedly will be of direct economic benefit in the future, is not essentially a cheapening process; in fact, these increased recoveries of coal have in large part become possible only because of a higher market price." (Extract from the address of Geo. Otis Smith at the Mining Congress Convention.)

Issuing Interesting Bulletins

Favorable comment is being made at the Geological Survey with regard to the bulletins being issued by the California State Mining Bureau. F. McN. Hamilton is the mineralogist in charge.

BUREAU OF MINES TO DIRECT DRAFTING OF NEW REVISION OF LAWS BILL

At Request of Chairman of Committee on Mines and Mining, Van. H. Manning Calls Upon Prominent Men in Industry to Assist in Preparing Measure

A bill providing for a thorough revision of the mining laws will be drafted under the direction of Van H. Manning, Director of the Bureau of Mines, before the convening of Congress in December. The bill now before the House Committee on Mines and Mining brought forth such a volume of protests that Dr. Martin B. Foster, the chairman of the committee, decided to hold it in abeyance until other proposals could be made available. For more than a year Dr. Foster has been urging Mr. Manning to prepare a bill covering the whole question of mining law revision. Mr. Manning was not anxious to undertake a work of this magnitude which is certain to bring forth much criticism and was only persuaded to undertake it when it became very evident that a commission for the study of the question was not likely to receive congressional approval, and that suggestions from other sources were not of such a nature as to make it possible to formulate a bill which was insured of anything like general approval.

Mr. Manning has called upon W. R. Ingalls, L. D. Ricketts, James Douglas, J. R. Finlay, J. Parke Channing, Hennen Jennings, and John Hays Hammond to assist in the drafting of a bill providing for a revision of the mining laws. Messrs. Ingalls, Douglas, Finlay, Channing and Hammond formed the committee which cooperated with the Bureau of Mines in the compilation of Rules and Regulations for Metal Mines, which was published by the Bureau as Bulletin No. 75. It will be recalled that this committee was originally appointed by the American Mining Congress. Its "Rules and Regulations for Metal Mines" is a notable work which is in the possession of nearly every metal mine operator in the United States.

It seems to be the opinion of many persons in touch with the mining industry in Washington that this committee will be able to formulate a bill which will be the basis for legislation which it is hoped to secure during the session beginning in December of this year.

UNCLE SAM MUST PREPARE TO MEET CUSTOMERS' NEEDS

"The customer who comes into Uncle Sam's store comes to buy what he wants, not what the men behind the counter have to sell. So, if our respected uncle is to prove himself a good shopkeeper, he must have on his shelves the goods that the customer nations need, and he must have right facilities for delivery." (Extract from the address of C. L. Dering at the Mining Congress Convention.)

FUEL PANIC GROUNDLESS BUT SOME AUTHORITIES MISJUDGED THE SITUATION

Both press and public have been criticised in connection with the anxiety which prevailed early in the winter in regard to coal supply. It is claimed by some that the newspapers featured unduly the prospects of a coal famine. The public also is blamed for allowing itself to be thrown almost into a state of panic when in reality real no reason for such confusion existed. Figures now available show conclusively that 10 per cent more anthracite coal was delivered to consumers during 1916 than was the case during the preceding year. The production of anthracite during 1916 was less than in 1915. Very apparently the quantity of coal in storage at the beginning of 1915 was larger than was generally recongized. That there was nothing unnatural in the attitude of the newspapers and the public is indicated by a review of the bulletins of the Anthracite Bureau of Information. This bureau is maintained by anthracite operators and it is very evident that even so well informed a source had fears of a serious coal shortage.

In the July bulletin of the Anthracite Bureau it is stated that "The general shortage of labor and the small stocks of coal on hand undoubtedly will make it difficult to supply the market next winter. If there is a repetition of last season's difficulties in railroad transportation the situation will be rendered still more acute. Under the circumstances consumers are warned to place orders now if they would insure themselves of their winter's supply."

A month later warnings were renewed as follows: "The decrease of more than 200,000 tons in July shipments as against those reported for June lends force to previous warnings that it may be difficult to supply the winter demand."

"The demand is far in excess of supply," says the October bulletin of the Anthracite Bureau. "The shortage of labor and the small stocks of coal on hand," says the bulletin, "together with a possible limited supply of cars, emphasizes the fact that there may be a scarcity of coal this winter, especially if the winter proves to be a hard one."

Seattle Station Opened

Hastily printed invitations were received in Washington early last month to attend the formal opening of the Seattle mining experiment station, January 12.

SCHOLZ WRITES "REVIEW OF REVIEWS" AS TO ARTICLE

Referring to the article in the January Review of Reviews, which discusses the Mining Congress paper of Dr. Geo. Otis Smith and C. E. Lesher on "The Cost of Coal," Carl Scholz has written the Review of Reviews as follows:

"In your January number on page 91, I note an article on 'The Cost of Coal,' discussing the article prepared by Dr. George Otis Smith and read before the Chicago meeting of the American Mining Congress on November 14 last.

"It has been my privilege to have served as president of the American Mining Congress for the last three years, and I have taken an interest in a broader sense in the coal industry, particularly on account of the very depressed condition the industry has been in and realizing that unless the smaller operators were enabled to make their properties profitable to the extent of paying usual rates of interest on money involved in any enterprise, in addition to dividends to which an industry as hazardous as mining is entitled, they would be wiped out of existence and monopolies would succeed them, which is a condition not desired by the country at large.

"In 1910 I was sent to Europe as consulting engineer for the Bureau of Mines to make some investigations on operating and labor conditions, and I used the information obtained in the preparation of a pamphlet entitled "A Statement of Facts," of which a copy is herewith enclosed. The tables shown on pages 13 to 24 will be particularly interesting to any student, and I want to call especial attention to the small amount of net revenue which was obtained in the year 1909 in Illinois and Indiana, two of our principal central western States, as compared with Westfalia. Also to the relatively high cost and selling values at the pit mouth in Westfalia compared with Illinois and Indiana. Even at present prices coal in this country is selling much below the selling prices in Germany, England or France. I, of course, refer to conditions existing prior to the war; and, if anything, considering the high wages, coal is much too cheap—in fact, its cheapness is responsible for the lack of sufficient interest by the smaller consumers to obtain the best results.

"As a member of a committee which first laid this matter before the Federal Trade Commission, I am convinced that cooperative measures are the only channels for relief. Just as you state at the top of the second column of page 92, the need for reducing transportation charges by shortening the length of haul is the most immediate solution of the problem. With coal fields at its doors, the central western States have no need for eastern coals carrying a freight charge of $2 or $3 per ton, when by treatment the native coals could yield by-products much more valuable than the raw coal was in the first place, in addition to furnishing a fuel capable of performing in every way the service obtained from the higher grade fuels.

"As a rule, the daily press is not far-sighted enough to be willing to place these matters in an intelligent manner before its readers. They seek sensational information and advocate the prosecution of imaginary trusts without knowing the real facts involved. The proper presentation, therefore, rests with the conservative publications which serve the entire country, and in this direction your magazine can render valuable and lasting service by studying the problem thoroughly.

"While no longer an official of the American Mining Congress, I am sure that body will be glad to supply you with information which cannot be disputed, as also will other coal mine operators and those familiar with the existing facts serve you with dependable data."

ROAD COMMISSIONERS IN ALASKA REPORT

The Board of Road Commissioners for Alaska has been building roads in that territory since 1905. Up to July 1, 1916, it built 920 miles of wagon roads, 629 miles of winter sled roads and 2,210 miles of trails. Of late there has been some criticism of this roadbuilding, indicated as follows in the last annual report of the board: "Alaska abounds in mineral wealth, fish and road-commission critics." One cause of the criticism is the poor condition of some of the roads, which is explained in the report in detail. None of the roads built by the board was constructed for automobile traffic and the board does not encourage the use of automobiles on them, but there were, nevertheless, over 250 trucks and passenger cars in use at the close of the last fiscal year and a regular motor mail and passenger service was maintained between Valdez and Fairbanks during the summer.

"Much damage has been done to the roads by the use of heavy, narrow-tired trucks," the board says; recently graded roads which would be satisfactory for light traffic are plowed up by trucks before surfacing is completed and expensive repairs are thus necessary before the road construction is finished and maintenance begins. An instance illustrating the conditions is furnished by the following extract from the report of the board's superintendent at Nome: "This road for 500 feet was destroyed by being worked out by a mining and dredge company. The district attorney would not give us protection and I had the piece of road rebuilt. Inside of two weeks after it was reconstructed, they destroyed it again." These traffic conditions make the roadbuilders' work difficult enough in themselves, but in addition there are the troubles of construction where the local conditions are far from comparable with those of the States. For example, last summer it became necessary to build a road 5 miles long along a hillside, and at one point the operations of a hydraulic mining company showed that the material underlying the location consisted of 6 feet of gravel on the bed rock, 40 feet of clear ice on the gravel, and 2 feet of moss and tundra on top. The only practicable construction for this locality was to cover the roadbed with willow corduroy and surface the corduroy with gravel.

A CARTOONIST'S CONCEPTION OF
H. C. ADAMS,
at the Mining Congress Convention

To Report on Iron Properties

E. C. Harder, a geologist in the Government service assigned to work in the iron districts in the Lake Superior region, has been granted a three months' leave of absence in order that he may make a report on the geology of the properties of the Brazilian Iron Ore Co. These properties are in the interior of Brazil.

Addresses Geological Society

Frederick G. Clapp, petroleum engineer and geologist, of New York, addressed the Geological Society of America at Albany, N. Y., on December 28 on the two subjects, "Ethics of the Petroleum Geologist" and "Revision of the Structural Classification of Petroleum and Natural Gas Fields."

MINERAL OUTPUT OF SEVEN STATES EXCEEDS $300,000,000

Mining in this district continues its extreme activity, says the Federal Reserve Bank at San Francisco in its report to the Federal Reserve Board. The mineral output of the seven States composing the district was valued at over $300,000,000 in 1915 and, due to high prices for all metals and the increased activity in this industry, this figure should be largely exceeded in 1916.

The November petroleum production of 263,209 barrels daily is a decline of 3,311 barrels daily compared with October, while shipments of 310,008 barrels daily is a new high record and an average daily increase of 6,356 barrels over October. Crude oil stocks on November 30 totalled 45,914,181 barrels. It is estimated that California's petroleum production for 1916 is 93,000,000 barrels, an excess of more than 2,000,000 barrels over last year. Consumption, however, aggregates more than 103,000,000 barrels, stored stocks having in consequence been reduced by more than 10,000,000 barrels. The value of this year's petroleum production is placed at $49,000,000. New wells opened during this year have been twice as many as last year.

Radio Detectors

Large profits which were made in the sale of pieces of galena suitable for detectors on the radio apparatus have been stopped by the manufacture of these detectors which permits of a big cut in prices. It is understood that galena for this purpose formerly brought as high as $7 per crystal.

Memorial Tablet for Dr. Holmes

A fund of $800 has been raised among the employes of the Bureau of Mines for the purpose of purchasing a memorial tablet for the late Joseph A. Holmes to be placed in the main entrance of the Bureau's new building at Pittsburgh.

WITHDRAWALS AND RESTORATIONS

A summary of the principal withdrawals and restorations, in acres, during the period from March 4, 1913, to December 31, 1916, as compiled by the Geological Survey, is as follows:

	Outstanding withdrawn March 4, 1913.	*Withdrawn during period.*	*Restored during period.*	*Outstanding withdrawn Dec. 31, 1916.*
Coal	65,410,464	668,664	20,645,156	45,433,972
Oil and gas	4,817,706	1,656,064	692,397	5,781,373
Phosphate	3,367,378	489,601	1,350,581	2,506,398
Potash	133,829	211,384	214,584	130,629
Power site	1,857,258	769,682	198,682	2,428,258
Public water	86,216	113,074	2,862	196,428
Total	75,672,851	3,908,469	23,104,262	56,477,058

Those Who Smelt Antimony.

Antimony is smelted in the United States by the following firms:

Magnolia Metal Co., 115 Bank St., New York City. Smelter at Matawan, N. J.

The Pennsylvania Smelting Co., Pittsburgh, Pa.

Great Western Smelting & Refining Co., Chicago, Ill.

Western Metals Co., 625 Security Building, Los Angeles, Cal.

Chapman Smelting Co., 409 Battery St., San Francisco, Cal.

International Smelting Co., Wm. Wraith, Mgr., Salt Lake City, Utah.

Antimony Smelting & Refining Co., Central Building, Seattle, Wash.

Besides these the American Star Antimony Co. is extracting antimony electrically at Gilham, Ark.; the Hoyt Metal Co., St. Louis, Mo., smelts more or less antimony ores in conjunction with lead ores to make antimony lead; and the John Finn Metal Works, San Francisco, Cal., has also treated some antimony ores.

KENTUCKY CONTINUES TO CLIMB AMONG COAL-PRODUCING STATES

The steady climb of Kentucky among the coal-producing States has been largely due in the last five years to the remarkable developments in the eastern fields, particularly in Perry, Pike, Letcher, Harlan, and Floyd Counties, and to the additional output from both old and new developments in these counties and in Johnson County is due the greater output in 1915 compared with that in 1914. Eastern Kentucky's high-volatile coal, particularly that from some of the easternmost counties, has been found to be excellent for making by-product coke and for use in gas plants, and large quantities are each year shipped for these purposes to the Chicago district, to points in Indiana, Illinois, and Michigan, and to St. Louis. The coal from eastern Kentucky is also sought for domestic use and for steam. The greater part of the coal from these counties finds a market north of Ohio River and meets in competition the coals from Ohio, Pennsylvania, Indiana, and West Virginia.

BIG DEMAND FOR PHOSPHATE ROCK AFTER WAR IS FORESEEN

The phosphate rock industry during 1915 was in the same bad condition, especially in Florida, that prevailed in 1914. Soon after the outbreak of the war in Europe the phosphate-mining companies of Florida, including not only those that produce the higher-grade rock for export but also those that supply the domestic trade, either curtailed production very materially or suspended mining.

Shipments of phosphate rock to Germany, hitherto a large consumer, have almost entirely ceased, and those to other European countries have been seriously interrupted. Business has been greatly retarded by lack of steamers and by increased freight rates, and there seems to be little likelihood of improvement till peace has been declared.

The great demand for sulphuric acid, especially toward the end of 1915, has also been a factor in curtailing the production of domestic phosphate rock. Acid prices have ranged so high that the manufacture of acid phosphate has shown a tendency to decline.

If the demands of German agriculture return to a normal condition after the war, and there is no apparent reason why they should not, the present lack of phosphate fertilizer in Germany, due in large part to stoppage of imports of phosphate rock, will probably be made up in efforts to bring the soil back to its former productive state. These efforts should create an increased demand for phosphate rock and tend to recoup to some extent the losses suffered by American producers, who will probably be given the preference over French and English producers.

AMERICA PART OF HEAVEN INVESTIGATOR CLAIMS

The Geological Survey is the recipient of some peculiar requests. Recently the Survey was asked to proclaim to the public that America is "the good part of heaven." The writer explained that, in endeavoring to find the oldest known idea of God, he had found an ancient Egyptian record which made it very clear that America is a portion of heaven.

LIGNITE MINES IN TEXAS BEING WORKED ACTIVELY

Commenting on mining conditions in the Dallas district the Federal Reserve Board says in its October report:

"The lignite mines of south Texas are being worked extensively, and a very superior grade of lignite is being produced. There is a good demand for the output at the prices of $1 to $1.25 per ton at the mines.

"Mining companies are operating on full time, and a number of new mines are being opened in Arizona and New Mexico. Good prices for copper have kept that industry active, and the mines of New Mexico are unable to get sufficient labor to keep up with their orders."

CHEMICAL INDUSTRY BOOMS IN THE SAGINAW VALLEY

The remarkable development of the chemical industry in the Saginaw Valley of Michigan greatly surprised W. C. Phalen of the Bureau of Mines, when he visited there recently. Such enterprise as is being shown in the Saginaw Valley, Mr. Phalen says, is rapidly making the United States independent of foreign countries in the matter of chemical supplies.

JAPANESE COMPANY TO WORK IRON PROPERTY IN CHINA

A prospectus has been published by the promoters of the Oriental Iron Smelting Company, which is to work the Taochun Iron Mine, Anhut, China, by taking over the concession obtained by the Chino-Japanese Industrial Development Company from the Pekin Government, according to advices from Yokohama to the Department of Commerce.

The proposed company, according to the prospectus, which is reviewed by the *Japan Times*, will have a capital of 25,000,000 yen ($12,462,500), with which to complete one plant for the production of 170,000 tons of pig iron annually, and another for the production of 150,000 tons of steel materials annually out of waste iron ores.

The company will depend principally upon the Taochun mine for its raw material, but ores will also be imported from Chosen and elsewhere for the purpose of maintaining a regular supply. The pig iron produced will be used in the manufacture of steel materials not exceeding 5 inches in size and under ½-inch in thickness, for which there is the greatest demand in Japan.

The construction of works and plants will cost 18,680,000 yen ($9,311,980). The whole amount is to be expended in three years, and at the end of the third year the buildings will be completed and the plants fully installed. It is planned, however, that half the required capital shall be paid in and the other half raised by floating a loan, rather than by sale of shares.

The zinc refining industry of Japan is of recent origin. Up to 1910 all the zinc required was imported. The zinc refinery as an industrial enterprise in Japan, says the *Japan Advertiser*, owes its origin to the founding of the Mitsui Zinc Refinery in Miike, Kyushu, in March, 1910. In the same year the Osaka Zinc Refining Company, in Osaka, and the Nippon Zinc Electric Refining Company, in Isojima, Niigata Prefecture, were started.

Since the outbreak of the European war, with the stoppage of the usual foreign sources of supply, the output of the three companies mentioned has increased to a total of 20,000 tons, or two-thirds of Japan's requirements. About 10,000 tons are being imported at present.

It is said that there are rich veins of zinc ore in all parts of Japan. Up to 1910, ore containing less than 40 per cent of zinc was thrown away and only the finer grades containing more than 40 per cent were exported.

One of the subjects in the symposium on Petroleum held by the Geological Society of America on December 27–29, was a paper by Myron L. Fuller of the Associated Geological Engineers on "The Appalachian Oil Fields."

CROW'S NEST COAL MINES BECOME INCREASINGLY IMPORTANT

The Crow's Nest coal mines of British Columbia are important because of their unusually large area and great productiveness, and on account of the rapidly growing railroad enterprises and the mining and smelting industries that depend on them for supplies of fuel, according to the advices of the Department of Commerce.

The Crow's Nest coal fields are 350 to 400 miles from the coast in the Rocky Mountains. The summit of the range is the dividing line between the section of the field situated in East Kootenay, British Columbia, and the part in southwest Alberta. The property of the Crow's Nest Pass Coal Co. is on the western slope of the Rocky Mountains, while that known as the Blairmore Frank district is in the eastern foothills of the same range. The coal fields cover more than 200 square miles.

The coal and coke shipments to the United States in the past six years were: 1910, coal $2,296,915, coke $43,755; 1911, coal $677,813, coke $8,846; 1912, coal $1,629,205, coke $251,453; 1913, coal $1,736,211, coke $257,378; 1914, coal $1,282,882, coke $276,694; 1915, coal $961,930, coke $118,694.

Besides the Crow's Nest Pass, there are in the Fernie consular district the following coal mines: Corbin Coal & Coke Co., Corbin; Hosmer collieries, Hosmer; Hillcrest collieries, Hillcrest; West Canadian collieries, Blairmore; McGillivray Creek Coal Co., Coleman; Franco-Canadian collieries, Frank.

AMMONIA PRODUCTION OF U. S. MAKES BIG JUMP IN 1916

Increased production of ammonia from 197,000 tons, in 1915, to 270,000 tons in 1916 is one of the striking developments of the year just closed. The fact that there has been an increase of 37 per cent in the production of ammonia is of interest in connection with the controversy as to whether the nitrogen produced from coal is a sufficient and reliable source of supply in time of war or whether it is necessary to secure nitrogen from the atmosphere by fixation. It has been stated by General Crozier before the House Committee on Military Affairs that the requirements of the War and Navy Departments in time of war would be 180,000 tons of nitric acid. A ton of nitric acid is equivalent, roughly, to a ton of ammonium sulphate.

AMERICAN CLAY EXCELS BEST GERMAN PRODUCT

C. G. Chevalier, Knickerbocker Building, Baltimore, Md., has reported to the Geological Survey that he has a clay known as "K-10" which is slightly superior to the famous Klingenberg clay formerly imported from Germany, which is suitable for use in the manufacture of crucibles and lead pencils.

IRON BLAST FURNACES MAY SUPPLY POTASH NEEDS OF UNITED STATES

Metallurgists See Important Verification of Their Theories in Recent Experiments at Bethlehem Steel Works—Fact that Potash is in Gas Rather than Slag Important

Recovery of potash as a by-product of the iron blast furnaces in an amount equal to the total quantity being used by the United States is a possibility of the near future, according to conservative metallurgists in Washington. That a very substantial recovery of potash from blast furnace operations is possible has been believed for some time by these specialists but in the light of the systematic experimentation which has been conducted at the Bethlehem Steel Works, the possibilities of the recovery of potash are seen to be materially greater. The recent announcement of the results of his experiments by W. J. Wiser, blast furnace superintendent of the Bethlehem Steel Works, has served to give great impetus to the thought which is being given the matter by Government specialists.

One of the developments of the Wiser experiments, to which much importance is being attached here, is that such a large percentage of the potash in the ore is given off in the gases, while a comparatively unimportant percentage goes into the slag. Experiments conducted heretofore have shown a much larger percentage of the potash in the slag, and it is gratifying to know that in actual operation a larger amount goes into the gases from which the recovery of potash is a much simpler matter.

Uncle Sam's Maps at a Premium.

That Uncle Sam's topographic maps are appreciated by public-utility corporations is shown by the fact that telephone companies throughout the United States are constant purchasers. These companies send frequent orders to the Geological Survey of the Interior Department for its maps in lots of 250 or 500, and occasionally when some big contract has been landed as many as 1,000 maps are ordered at a time for the use of the engineers and linemen. Some electrical supply companies keep complete sets of the maps of areas in States in which they expect to do extended work, and when they hear that contracts are to be let for such work they refer to these maps, and with the "lay of the land" before them can tell at a glance the character of the work that will be required, and can make their bids promptly and intelligently. The telephone officials who are "using the maps extensively" state to the Survey that they are of "indispensable value" in their work.

MINE SUPPORTS MAY BE SUBJECT OF INVESTIGATION

An investigation of the whole question of mine supports may be undertaken during the next fiscal year by the Bureau of Mines if nothing interferes with the present plans of George S. Rice, the chief mine engineer. There is a demand for more accurate information with regard to the strength of the coal left in pillar as well as the strength of various supporting materials, including concrete and brick arching. There is much indefiniteness as to the amount of stress thrown on artificial supports by rock movements. This feature of the problem will receive special attention.

Issues New Bulletin

The Jeffrey Manufacturing Company of Columbus, Ohio, manufacturers of coal mining machinery, has added another improvement to the list of Jeffrey locomotive features, in its new Arcmaster and Solenoid Switch, which has been designed to eliminate punishment of the fingers and contacts on the controller drum, due to the heavy duty of large controllers necessitated by the demand for larger motor equipment.

The Arcmaster is mounted on top of the standard controller, takes the place of the controller handle and controls the electric circuit of the operating coil in the solenoid switch, which is mounted in a convenient place on the locomotive outside of the controller casing. A movement of the Arcmaster handle to operate the controller, for starting, first closes the solenoid switch which closes contact between the controller and the trolley. A reverse movement of the Arcmaster handle to throw the controller off, first opens the solenoid switch, and the controller drum is then thrown to the off position without breaking any current.

The new equipment eliminates all burning of the contact fingers and arc deflectors of the controller, thereby reducing the cost of upkeep of control and increases safety of locomotive operation, by eliminating all chances for the controller to fail to open the circuit.

The Arcmaster is a standard equipment on all Jeffrey Trolley Locomotives about 4 tons in weight, and can be applied to any make of controller without necessitating any radical changes.

A free copy of *Bulletin* No. 204, fully illustrating and describing this new apparatus, can be obtained by writing to the home office of the Jeffrey Mfg. Co., 958 N. Fourth Street, Columbus, Ohio, or to any of their branch offices.

A CARTOONIST'S CONCEPTION OF
COL. H. E. GOODMAN
at the Mining Congress Convention

HALF OF ANTHRACITE COAL IS SOLD IN SMALL LOTS

"About half of the anthracite and around 15 per cent of the bituminous coal is retailed in less than carload lots, and the greatest number of individuals are directly concerned in the marketing of this portion, regarding the profits on which there is the widest divergence of opinion." (Extract from the address of Geo. Otis Smith at the Mining Congress Convention.)

Alaska Would Hold Exposition

Juneau is planning to stage an Alaska Purchase Exposition next summer. Requests for Federal assistance toward making this exposition a success have been received here.

UNDER-WATER COAL STORAGE POSSESSES MANY ADVANTAGES

Advantages accruing from the storage of bituminous coal under water are becoming more and more apparent and much larger quantities of coal are being stored in this manner, according to information reaching the Geological Survey. The fact that this method of storage relieves the danger of fire and prevents the deterioration of coal, as well as eliminating expense for insurance, is causing it to be encouraged by the Government's coal specialists.

COAL BUSINESS ACTIVE IN THE BITUMINOUS FIELD

The coal business is quite active at prices somewhat under what they were a month ago, according to a report to the Federal Reserve Board from its bank at Cleveland. The freight embargo is being felt in this industry. Both coal and coke trades are looking forward to 1917 as registering the largest and most uniformly profitable business ever experienced. This view is based on the fact that six and twelve months contracts are now being concluded with large consumers at prices ranging 50 cents to $1 a ton over the contract prices realized for the 1916 output.

Oil and gas interests are prosperous. In some instances prices being paid for oil are the highest ever recorded. Great activity is taking place in the Kentucky oil fields. Production is increasing in that district and considerable money is going there for investment. The clay industry is active in all its branches.

Takes Up Graphite Work

H. G. Ferguson of the Geological Survey has succeeded E. S. Bastin in the work being done on graphite. Mr. Bastin is spending a year in private employ in South America.

Electric Radiators Praised

The subject of mine heating is one which at present is commanding considerable attention, and, while not differing fundamentally from other heating problems, does present certain difficulties necessitating additional precautions. The following features, while not essential, are certainly desirable and are to be considered when planning the heating system of a mine: Safety and lack of danger from fire; reliability and ease of control; low cost of installation; economy of space; flexibility and control; ease with which the heating system from one section can be discontinued and moved to a new location; cost of operation.

Heating by electricity at once covers many of these points, and the electric radiators manufactured and sold by the Lee Electric Radiator Company (7031 Stewart Avenue, Chicago) takes care of them all, according to assertions made by the manufacturers.

The heating element is immersed in an oil similar to that used in transformers absolutely preventing the burning out of the coils. Since the whole is inclosed in a standard pressed steel radiator (the same as used in steam heating) all danger from fire is eliminated. It is far safer than the electric light.

Inasmuch as no steam pipes are required, a wire connecting radiator to source of electric current being sufficient, the cost of installation is a minimum. The running of steam pipes through a mine, on different levels, keeping them out of the way, is an expensive job. With electric radiators, the necessity for steam traps is done away with.

TWO "GEMS" ARE ADDED TO BUREAU OF MINES LETTER COLLECTION

A surprising number of letters containing amusing questions and absurd requests are being constantly received by the Government Departments. Within the last few days the Bureau of Mines has been in receipt of two letters that might be termed "gems" in their extensive collection of communications of this class.

Here are a few of the questions asked in a 1,000 word letter.

"Does a visible difference exist between the fine colloidal bodies as seen by the aid of the ultra microscope, or are the differences assumed to exist from the fact that in the mass they constitute dissimilar matter?

"Have enzymes been demonstrated to consist of, or contain, corpuscular bodies?

"Are corpuscular bodies, as seen by the ultra microscope, spherical or in contact?

"Do you believe that corpuscular bodies and electrons are identical?

"Do you believe that there exists in the center of the corpuscular bodies nidus's similar to the centrosome's of cell life?

"Would you consider it proper to say that the centrosome was a corpuscular body?

"What is your opinion of Plato's definition of the worlds soul as being an immutable intangible colorless formless essence that is only visible to the mind?

"If the nidus of the corpuscular body was composed of nonether (an essence) revolving on its axis, and surrounging this sphere was a film of ether—would the law of opposites cause this film of ether to revolve in an opposite direction to that of the nonethereal sphere—or would the attraction of gravity or friction cause it to revolve in the same direction but at a decreased speed—or would the fact that nonether has no extension permit the etheral envelope to remain in a static condition?

"If energy, in the form of electricity, is competent to enter into a chemical compound, would you consider from that fact that energy and matter are identical?

"What do you think the ancient philosophers and alchemists meant when they referred to the missing link, the philosopher's stone, and the transmutation of metals?"

The other correspondent referred to above styles himself as the only personal mineral divining rod in the world. He claims to have some remarkable powers which enable him to trace veins and to discovery of ore bodies. He writes the Bureau of Mines as follows:

"Gravitator of the World Elements.

"I discovered about the year of 1900 that, I am a Personal Mineral Gravitator (or a Personal Mineral divining-rod.)

"The elements of the earth are visible to me, with their affinity. I discover where the fissure is, I have felt fissures about a mile away. I eye size the fissures, and, estimate about how big the ore shoot is.

"I can feel the fissures of the earth, the difference strength of them, I can stake out the length, the difference in width, make surface survey, calculate the dip, and, estimate at any depth where the intersection is at.

"I have a specific gravitation inspiration, the earth affinity controls my breathing, the fissures in the difference places, has different strength, and, it pulls my breathing at a different speed, and strength.

"I discovered this law, in Anchor, N. Mex., in a small mining town, near the Colorado line, it was erected in Denver, Colo. and northern New Mexico. It is on record in Taos, N. Mex.

"I discovered the science in the Jumbo drift while I was waiting for a forked stick divining rod to locate the veins with. I stepped up on the edge of the vein, and, I discovered there was a different feeling at the different places I was standing at. My curiosity was emotion to examine the ground to see if I could realize the different feeling of the earth, and, if I could feel the difference between the country rock, and, the vein, I stepped back and, standardized myself, and, then I slowly advanced up on the vein, and, found there was a different feeling there between the country rock, and the vein, and, I could detect the edges of the vein.

"I would like to have this on United States record."

Magnesite in California

Magnesite is a carbonate of magnesium ($MgCO_3$), having, according to Dana, a specific gravity of 3 to 3.12, and a hardness of 3.5 to 4.5 It is somewhat heavier than calcite (2.714 specific gravity), and is about one-third harder, the hardness of calcite being 3. It contains 52.4 per cent of carbon dioxide (CO_2) and 47.6 per cent of magnesia (MgO).

As it occurs in the California deposits, magnesite when comparatively pure is ordinarily a beautiful, white, fine-grained rock, with a conchoidal fracture that looks like a break in china. It will take a fine polish and when so treated is an opaque white. A portion of the magnesite occurs in a fine powder in what seem to be decomposition cavities and upon surfaces exposed to weathering.

Greeks Thought Earth a Sphere.

A number of the Greek philosophers regarded the earth as a sphere. Among them the most prominent was Aristotle, who used modern arguments for this thesis, such as the gradual disappearance of a ship at sea from hull to mast, the circular shadow cast by the earth upon the moon at eclipses, and the alteration in the aspect of the heavens as seen from different latitudes.

The spheroidal form and rotation of the earth formed an essential portion of the Copernican system. Copernicus lived from 1473 to 1543. The globular figure of the earth was not accepted by the public at large until Columbus had crossed the Atlantic and Magellan's expedition had circumnavigated the globe. From that time onward it has been accepted by all scientific men and most others.

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HOLMES MEMORIAL VOLUME EXCITES FAVORABLE COMMENT

That men prominent in the mining industry throughout the country think favorably of the issuance of a memorial volume for the late Dr. Joseph A. Holmes, the first director of the Bureau of Mines, is indicated by testimonials contained in letters being received by the American Mining Congress. A few of these letters are reproduced as follows:

"New York, January 3, 1917.

"I have received and read the memorial volume on Dr. Holmes. The expressions of admiration for his character and works, by men who knew him so well, are not exaggerations.

"He himself was not only a thinker and theorist, but he was not content till he had put his conceptions into practical form. Hence the magnificent technical and relief work done by the Survey under his instigation.

"Inspired by the spirit of the first director, and under the able guidance of his successor, the staff of the Bureau cannot fail to do even more efficient work in the future than they have in the past.

"(Signed) J. DOUGLAS."

"Salt Lake City, Utah,
January 2, 1917.

"I have examined with real pleasure my copy of the beautiful Holmes Memorial Volume which reached me a few days ago, and I want to compliment you upon the fitting and artistic manner in which you have carried out the happy conception of such a monument to the life work of Dr. Holmes. I trust that this memorial will stimulate interest in the Bureau of Mines, so that its beneficent activities may be continued and extended.

"(Signed) JOHN DERN."

San Francisco, January 1, 1917.

"Your letter of December 20 and the Holmes Memorial Volume reached me in due time. The memorial is quite attractive, very interesting, and in every way an appropriate tribute to a great and good man who did noble service for science and for his country.

"(Signed) D. C. JACKLING."

"Kemmerer, Wyoming,
"December 28, 1916.

"I am very glad to acknowledge receipt of the beautiful volume preserving the record of the many eloquent and deserving tributes paid to Dr. Holmes, at the memorial exercises held at San Francisco, September 21, 1915.

"I shall treasure and preserve it. It is worthy of a place in any library, as well for its worth as an example of eloquence as for the worthy character it portrays.

"(Signed) P. J. QUEALY."

"Cleveland, Ohio,
"December 30, 1916.

"I have just been looking over the Holmes Memorial Volume and am very much pleased with the way it was gotten up, but more particularly on account of the evidences of high regard in which Dr. Holmes was held by so many eminent and well known men. This is great gratification to his friends and a worthy tribute to a most deserving man.

"(Signed) W. G. MATHER."

"Douglas, Ariz.,
"January 8, 1916.

"The Holmes Memorial Volume was received, and is very much appreciated indeed. I think it is just what it should be.

"(Signed) J. S. DOUGLAS."

NEW PROCESS FOR CRACKING OILS HAS BEEN DEVISED

Information has reached Washington from a reliable source, that a process for cracking oils has been developed in the West which will have an important influence on the refining of oil throughout the country. It is said to possess advantages over the Burton, Rittman and other methods of cracking oil. The development of the process has been conducted in an isolated refinery in a western State. Coal-gas retorts have been used to treat the crude oil. Recovery of benzol, toluol and of a very rich gas has resulted. It is stated that the process does not involve the use of special apparatus.

BUREAU OF MINES HAS MORE THAN 30 BRANCHES

A collection of photographs showing all the buildings and offices of the Bureau of Mines throughout the country is being made at the direction of Van H. Manning, the director. The Bureau of Mines has branches in more than thirty different places.

LAKE SUPERIOR OPERATORS INTERESTED IN BENEFICIATION METHODS

Growing Scarcity of High Grade Ores Causes Attention to Turn to Improvement of Quality and Texture of Ores—Edmund Newton and Harlan Bradt Discuss Principles Underlying Various Treatments

Beneficiation of iron ores is one of the livest and most important matters of interest among Lake Superior operators at this time. Edmund Newton and Harlan H. Bradt, of the Mines Efficiency Company, of Duluth, have given Ernest F. Burchard of the U. S. Geological Survey some of their ideas in regard to this matter. A part of their contribution is as follows:

Since the earliest mining in the Lake Superior region there has been an effort to improve the quality and the texture of the iron ores. This is evident in selective mining, where the material blasted or picked down is, so far as practicable, only of the character desired. After breaking down the material pieces of waste are picked by hand from the ore, thrown into old openings or placed to one side, and later carried to the surface or to another part of the mine where they can be disposed of. Generally, at the shaft, the ore is dumped through a grizzly into a pocket or into a skip, the large pieces of ore remaining on the bars. These are sledged, both to facilitate handling in further transportation, to eliminate waste rock, and to make a more desirable ore for the furnaceman. In some mines underground sizing is purposely employed to separate the large pieces, which are known to be mainly waste.

When the ore reaches the surface it is frequently subjected to another screening operation before dumping into surface tramcars or pockets. Lean pieces are rejected by the landers. Furthermore, if the ore is stock piled, a man is often kept sorting out waste rock from the coarser material at the foot of the pile and sledging and separating pieces of attached ore and rock.

Crushing of iron ore has been adopted at numerous mines, and the advantages of crushed ore were early recognized.

Devices to facilitate hand picking have been used at two mines at least in Michigan, and one is presently in use at the Ohio mine, near Michigamme, on the Marquette range. At the Helen mine, Michipicoten range, Ontario, Canada, the crude ore is crushed and screened and then passed over a picking belt to eliminate as far as possible pieces of pyrite.

STEP NOT RADICAL ONE

It is evident that beneficiation of iron ores has, in a more or less crude way, been effective in the Lake region since the commencement of mining. It is of interest to call attention to this fact, inasmuch as it has been considered that the use of mechanical means of beneficiation is a radical step, whereas the Lake region, as a matter of fact, has been approaching such treatment of ore in a logical manner. The miner has unconsciously been practicing beneficiation of iron ore since the opening of the region. The step from crude means of sorting and breaking ore to mechanical processes adapted to the same purpose may be likened to the step from shoveling by hand to steam shoveling stock piles and mechanically loading ore underground.

The advance to methods of beneficiation on a large scale has been due to the desire to make available deposits of material below commercial grade—to treat parts of high-grade deposits which can be easily and cheaply mined but which if not recovered in the first mining operation will thereafter be inaccessible—in general, to practice efficiency and conservation. To a small extent some of the more farsighted companies have been prompted to investigate methods of beneficiation because of the approaching exhaustion of the supply of high-grade ore in the region.

The possible improvement in grade of iron ores by mechanical means has been under serious consideration in the Lake Superior region since 1888. At that time John C. Fowle installed a small magnetic separation plant on the Marquette range at the Michigamme mine, Michigamme, Mich. The material treated was lean amphibole-magnetite rock. In the Transactions of the American Institute of Mining Engineers (Vol. 19, p. 62), Mr. Fowle states that in 1889 there were shipped from this property 11,000 tons of concentrates carrying between 60 and 65 per cent iron. In 1890, there were shipped 15,000 tons. The plant had a daily capacity of 180 to 200 tons. The material was crushed, treated on dry magnetic separators, and loaded on cars at a cost of 18 cents per ton of concentrates. The recovery of concentrates varied

from 50 to 70 per cent. The tailings carried from 21 to 24 per cent iron. The reasons for discontinuing this operation cannot be ascertained.

About 1890 a concentrating plant was installed at the Groveland mine, Menominee range, 4 miles east of Randville, Mich. It was intended to treat a uniformly hard hematite ore mixed with diorite, containing 48 to 50 per cent iron. Rather fine crushing was necessary, and it was hoped to produce a concentrate carrying approximately 65 per cent iron, dry, and lower in phosphorus than the crude ore. Jigging and treatment on slime tables was tried, but after a short period of operation, work was suspended and never resumed. (This information was obtained through private communication.)

LEAN ORES FORGOTTEN

In 1891, N. H. and H. V. Winchell, in predicting the future use of the lean magnetite ores of the Gunflint and eastern Mesabi range, in Bulletin 6 of the Minnesota geological and natural history survey, mentioned that material of similar character had been concentrated by jigging at the Chateaugay mines, Lyon Mountain, N. Y., and also at the Croton mines in Putnam County, N. Y., and in Pennsylvania and New Jersey. They suggested a similar treatment for this Minnesota material. Shortly afterward, the present productive or high-grade portions of the Mesabi range were opened, with the result that naturally rich ore was available in quantity and with mining conditions hitherto undreamed of. Concentration of the lean magnetites was consequently forgotten for many years.

In 1899, L. M. Hardenburgh installed a small jigging plant for the Pewabic Mining Company at its Pewabic mine, near Iron Mountain, Mich. Mr. Hardenburgh describes this plant in the Transactions of the Lake Superior Mining Institute, volume 6, page 23. The material treated consisted of fragmental iron ore contained in a sandstone. The fragments of ore were rounded and waterworn and their distribution throughout the sandstone was fairly uniform. They varied from the size of a pea to masses several hundred pounds in weight.

The material as hoisted from underground was passed over a grizzly, with bars spaced 1½ inches apart. The oversize was hand picked, the clean ore and clean rock being separately removed. The remainder was crushed in a jaw crusher and rolls. After screening, it was treated on eighteen Hartz jigs. The capacity of the mill was approximately 300 tons a day. It is understood that this operation was discontinued on account of exhaustion of the ore body.

The next consideration of the possibilities of concentrating Lake Superior iron ores appears to have been in 1901, when Walter Barrows, Jr., Charles A. Purdon, and associates were exploring the sandy ores of the Arcturas property on the western Mesabi range, Minnesota. To determine whether this material was amenable to concentration, they sent a carload to Cedartown Ga., for treatment on log washers. The results were satisfactory, and they subsequently installed a small screening and jigging plant on the property. A screening plant was also installed by Chester A. Congdon and associates at the Holman mine near by. These plants demonstrated that a separation could be made between the ore and the sand.

In 1906 and 1907 a roaster was installed at the blast-furnace plant of the Atikokan Iron Company (Ltd.), Port Arthur, Ontario, to treat the high-sulphur magnetites from the Atikokan range. Blast-furnace gas was used to give the required heat. Sulphur was reduced from about 2.50 per cent in the crude ore to about 0.25 per cent in the roasted product. The roaster used was oblong in shape, supported on steel legs, and divided into sixteen sections, each containing separate combustion, roasting, and chimney chambers. The products of combustion passed through the ore to the chimney chambers, where they were drawn by exhaust fans into a chimney. The ore, which was fed from the roaster bins, remained in the roaster for 24 hours, each chamber holding 25 tons.

It is reported that a concentrating plant was built between 1900 and 1908 at the Jackson mine, near Negaunee, Mich., but this could not be substantiated.

The Oliver Iron Mining Company began experimental work on the possible treatment of the sandy ore of the western Mesabi range in 1907. This company erected an experimental plant on the shores of Trout Lake. Extensive experiments were carried on and a satisfactory method of treating this material was evolved.

THE JONES EXPERIMENTS

A series of metallurgical experiments were begun in 1908 at Iron Mountain, Mich., by John T. Jones. A cylindrical rotary kiln fired by a producer-gas flame was used to heat lean siliceous iron ore mixed with coal. It was found impracticable to obtain certain desired results, but it was possible to deoxidize, or metallize, the iron oxide below the fusing temperature of the gangue, and later to crush and separate the material magnetically. The producer-gas flame was soon abandoned and a powdered-coal flame used instead. Before introduction the ore was crushed. The Iron Mountain plant was operated intermittently from 1908 to 1911, when it was abandoned.

In 1908, a magnetic cobbing plant was erected at Moose Mountain, Ontario, where a metamorphic, relatively thick banded magnetite ore was coarsely crushed and separated on magnetic separators. From a crude material containing 35 per cent iron a concentrate was obtained carrying about 54 per cent iron.

As a result of the experiments made by the Oliver Iron Mining Company, at Trout Lake in 1907 and following years, a large washing plant was erected at Coleraine, Minn., which began operations in 1910. It has been in successful operation since that time and has been the model for several later plants. This plant consists of five units, each having a crude-ore capacity of approximately 7,000 tons in 20 hours. Each unit consists of the following con-

centrating apparatus: One 500-ton crude-ore bin; 1 grizzly, 12-inch centers; 1 trommel, 20 feet long, 1¼-inch round hole; 1 picking belt, 35 inches wide; 2 log washers, 25 feet long, steel; 3 settling tanks; 20 Overstrom tables.

At Moose Mountain, Ontario, a crushing and fine-grinding plant, followed by Grondal wet magnetic separators, was installed in 1911 and 1912. This plant was designed to treat the magnetic iron formation in which the gangue and the ore were intimately intermixed. The fine concentrate produced contained about 63 per cent iron and required agglomeration, and for this purpose Grondal briquetting kilns were used. Several changes have been made in the plants and in 1915 further experiments were being conducted.

In 1910 a series of tests were made at the Newport mine, Gogebic range, Mich., for which a Bradford breaker was installed, to disintegrate and screen low-grade cherty ore. The oversize of a 1¼-inch screen was hand picked on a moving belt.

The first installation for agglomerating iron ore in the Lake region was made in 1911 by the Northwestern Iron Company, at Mayville, Wis. Grondal briquetting kilns were used to briquet fine Clinton hematite from the mine and flue dust from the blast furnace near by.

The first drying plant to be installed in the Lake region was a rotary drier at the Hollister mine, Crystal Falls, Mich., which was completed in 1911 by the M. A. Hanna Company.

During 1912, a washing plant erected by the International Harvester Company at the Hawkins mine, near Nashwauk, Minn., began operations. This plant consisted of one unit similar to the Coleraine plant, except that no tables were installed.

In 1912, a small plant was erected by A. B. Coates at the Madrid mine, Virginia, Minn. The ore was mined underground. It was desired to remove a certain amount of sandy silica, which was mixed with the ore. A trommel and log washer were first installed. The log washer abraded the ore particles, producing an excessive amount of fine hematite, which was lost in the tailings. Consequently a separator invented by Mr. Wetherbee was installed.

In 1912, a drying plant for reducing excessive moisture in certain materials was installed by the M. A. Hanna Company at their Brunt mine.

Further metallizing experiments were made by John T. Jones at Republic, Mich., in 1912, at a plant built during that year. Bruckner rotary kilns were used in which to carry on the deoxidation, and, after metallizing, the material was crushed and separated on Ball-Norton and Dings magnetic separators. As the metallic product was too fine for convenient shipping and further treatment, it was attempted to briquet it under pressure. Operations were suspended in 1912.

EXPERIMENT STATION ESTABLISHED

During the season of 1912, a mines experiment station was organized at the School of Mines, University of Minnesota, Minneapolis, Minn. The purpose of this station was to aid the mining industry of the State. On account of the activity in the concentration of iron ores, this investigation was taken up in detail. A testing plant was equipped with suitable machinery for the testing of various types of low-grade Minnesota iron ore. General investigations have since been made on the sandy Mesabi ore, on Cuyuna ores, on the lean magnetites of the eastern Mesabi range, and on the titaniferous magnetite of Cook and Lake Counties. A large number of tonnage tests have been made for many of the mining companies. Bulletins are published from time to time as data become available.

During 1910, 1911, and 1912, calcining experiments were made on the carbonate ore from the Magpie mine, Michipicoten range, Ontario, by the Algoma Steel Company. In 1911 and 1912 a calcining plant consisting of a 120-foot rotary calcining kiln, followed by two 60-foot rotary roasting kilns, was installed. Previous to the heat treatment the material was crushed to 1½ inches. In 1913 the two small kilns were dispensed with, the whole operation being performed in the 120-foot kiln. Five units are now installed, and the capacity is about 20,000 tons a month.

In 1913, two concentrating plants were installed by the M. A. Hanna Company, one at the La Rue mine at Nashwauk, on the Mesabi range, Minn., and the other at the American Boston mine, Diorite, Mich. Both of these plants included novel features of treatment. The La Rue ore was of the "sandy type," somewhat similar to the Hawkins ore. Instead of using the customary log washers, however, a Wetherbee separator and a Woodbury slime classifier jig were installed, in parallel, for testing. Wilfley tables were used to recover the fine mineral. The Wetherbee separator operates by a combination of centrifugal force and an upris ng current of water. The fine sand rises with t he water current and overflows, while the lumps, which are good ore, drop to the bottom and are withdrawn as concentrates. At the American Boston mine the ore was of a hard banded character, containing coarse particles of cherty silica as gangue. An extensive plant was erected with Richards pulsator jigs as the main concentrating units.

In 1914, another drying plant was erected by the Shenango Furnace Company at their Whiteside mine on the Mesabi range

A new metallizing plant was built by John T. Jones in 1914 at Marquette, Mich. A furnace of the shaft type was used into which the ore was introduced from a rotary preheater, through which the waste gases from the furnace passed into a stack. At the close of 1915 experiments were still being conducted at Marquette, various changes having been made in the apparatus.

INCREASED ACTIVITY IN 1915

In 1915 considerable activity in beneficiation was shown. Two washing plants, consisting of single units of relatively standard type, including log washers and tables, were installed on the Mesabi range, one by Butler Brothers, of St. Paul, at the Quinn-Harrison mines, and

the other by the Cleveland Cliffs Iron Company at the Crosby mine. Both of these plants are near Nashwauk, Minn.

During 1915 the concentration of Cuyuna range ores was also begun. The Inland Steel Company installed a small washing plant consisting mainly of screens and log washers at the Thompson mine, Crosby, Minn. The Pittsburgh Steel Ore Company also installed a washing plant of considerable size at the Rowe mine, Riverton, Minn. At the time this plant was built, log washers and tables were installed to remove the sandy silica, but it was proposed later to install jigs for the purpose of removing the coarser chert. A small experimental washing and hand-picking plant was installed at the Cuyuna-Sultana mine to treat manganiferous iron ore.

In 1915 experimental work was begun on an extensive scale on the lean magnetites of the eastern Mesabi range. A large amount of this work was done by the experiment station of the Minnesota University School of Mines. In connection with this experimental work, two new types of wet magnetic separators were developed by the experiment station. On account of the favorable features of ordinary log washers in use on other types of Minnesota ore, magnets were attached to the bottom for use on this class of material. This machine, which is called a magnetic log washer, has been tried out in a very exhaustive series of tests and produces high-grade concentration and low tailings at a high capacity. The other type mentioned consists of a wash trommel with magnets attached to the outside of the drum.

METHODS OF TREATMENT

Several methods are in use commercially or experimentally in the Lake Superior region at the present time. The largest tonnage is treated by crushers, log washers, or similar machines, but some ore is jigged, some is dried, and some is calcined.

The character of material treated is exceedingly varied, and it is impossible here to give actual results of treatment. The "washing plants" seldom treat sandy ore below 40 per cent iron (dry), and they generally recover 60 to 75 per cent of the ore in the form of concentrates. These concentrates carry from 55 to 60 per cent iron (dry). These figures depend almost entirely on the character of the ore.

In order to understand the reasons for the difference in the character of the concentrating plants already described, it is essential to consider the character of the various low-grade iron-bearing materials of the Lake Superior region.

The productive Lake Superior iron formations are sedimentary in character. They were probably laid down originally either as cherty iron carbonates or as hydrous ferrous silicates and iron oxide. The conditions of deposition varied from time to time, giving rise to a banded formation consisting alternately of siliceous layers and layers mainly composed of iron minerals, or some gradation between the two.

Secondary concentration was effected by surface waters which first oxidized and hydrated the iron carbonate and silicate. Then silica was leached out along channels of circulation. When this leaching had progressed nearly to completion, the high-grade ore bodies resulted which have produced the direct shipping ores on the several ranges.

By far the largest quantity of the iron-bearing formation has been more or less imperfectly acted upon by these processes of secondary concentration. Such material constitutes all but one class of the so-called low-grade iron-bearing material. The exceptions are the titaniferous magnetites of Cook and Lake Counties, Minn., which appear to be magnetic segregations in the Duluth gabbro.

A large factor in the retardation of secondary concentration seems to have been metamorphism by heat, pressure, or both. This presumably occurred while the iron was largely in the ferrous condition and produced the magnetic oxide of iron, and other mineral constituents, which withstood the further solvent action of the surface waters. Examples of this type of material are found abundantly on the eastern Mesabi range, the Gunflint district, the western Gogebic range, and at certain points on the western Marquette range, such as at the Michigamme mine. In other places, where this metamorphic action has not taken place, leaching proceeded very slowly or not at all. As a result, we have, today, relatively hard banded material consisting of layers of more or less siliceous hematite, sometimes containing considerable molecular water, and layers of relatively hard unleached cherty silica or rock. Examples of material of this character are the solid or partially decomposed taconite of the western Mesabi range, the relatively hard cherty ores of the Cuyuna and Gogebic ranges and the banded jasper and ore of the Vermilion and Marquette ranges.

When leaching had progressed farther than in the class of material just mentioned, but had not been entirely completed, we find what is termed, locally, "sandy ore." Such material consists of alternate bands of more or less siliceous, hydrated hematite interlayered with fine sand. The sand has resulted from the disintegration of the hard cherty bands, but has not been entirely removed. Examples of this type of material are found in the ore bodies of the western Mesabi range, lying principally west of Nashwauk and in minor quantities throughout the central Mesabi and on the Cuyuna range.

The discussion so far has been limited to materials which are low in iron on account of large percentages of silica. Other impurities occur in Lake Superior iron-bearing material, which either render them too low in iron to be shipped direct or else undesirable for furnace use. These impurities are principally phosphorus, sulphur, titanium, alumina, and moisture.

PHOSPHORUS ALWAYS PRESENT

Phosphorus occurs in greater or less quantity in all Lake Superior iron-bearing material. Its presence above certain limits causes a penalty

to be imposed by the furnace men. Sulphur occurs as sulphide of iron and as hydrous calcium sulphate at certain places in prohibitive quantities. Titanium occurs in the so-called titaniferous magnetites of northeastern Minnesota. Its presence presents blast-furnace difficulties. Alumina occurs in the so-called "paint rocks" of the Mesabi and other ranges. Although the iron content is relatively high, difficulties arising in the blast furnace prevent its use at the present time.

Moisture is present in greater or less quantity in all the ores; in some ores it runs as high as 16 or 18 per cent. This is often sufficient to lower the "natural iron" content below the merchantable limit, and high transportation rates from the Lake region to the furnaces prohibit the shipment of such large quantities of water per unit of recoverable iron.

As has already been shown, interest in the mechanical improvement or beneficiation of Lake ores dates back to small beginnings nearly thirty years ago. On account of the great draft upon the reserves of the high-grade ores, it is a subject of considerable importance at the present time. It will, therefore, be of interest to review the various methods of beneficiation now available.

It is evident that the character of treatment will depend on the type of material under the discussion and on the impurity to be removed. In general, the following principles of "beneficiation" will be found applicable either at the present time or at some future date for low-grade iron-bearing material of the Lake region.

Thermal processes.—(*a*) Drying—removes ordinary moisture and some combined water and is employed to facilitate the removal of clay, rock, and sand.

(*b*) Calcining—removes carbon dioxide from iron carbonates, combined water from hydrated hematites, and ordinary moisture. Under proper conditions the magnetic oxide is produced.

(*c*) Roasting—removes sulphur, carbon dioxide, combined water, and ordinary moisture.

(*d*) Agglomerating—used primarily for the purpose of preparing finely divided material for the blast furnace. Includes briquetting, sintering, and nodulizing. Removes sulphur, carbon dioxide, combined water, and ordinary moisture.

(*e*) Metallizing—reduces iron oxide to metallic iron without eliminating gangue. Incidentally accomplishes all that (*a*), (*b*), and (*c*) accomplish.

Mechanical processes—(*a*) Hand sorting—to remove coarse rock.

(*b*) Crushing—reduces ore to size suitable for blast-furnace use, and is also used preliminary to other mechanical processes.

(*c*) Screening—removes large pieces of rock and fine sand.

(*d*) Classification—removes sand by means of currents of water of varying velocities.

(*e*) Log washing—removes fine sand.

(*f*) Jigging—removes larger particles of gangue than is possible by log washing. Certain types of jigs remove fine sand.

(*g*) Reciprocating tables—recover fine iron mineral from sands discarded by the processes named above.

(*h*) Magnetic separation—applicable to the commercial separation of the magnetic oxide of iron from gangue material. It is possible, but not commercially practicable, magnetically to separate certain hematites and limonites from their gangue.

(*i*) Miscellaneous processes—comprise dry concentration, electrostatic separation, flotation, and other processes which have been applied with more or less success to material of certain districts.

Certain materials may be of such character that a single simple operation may suffice to beneficiate them; others may require more complicated treatment, involving several methods.

From a technical standpoint, what can be accomplished by beneficiation will depend on the physical and chemical character of the impurity to be removed. In the sandy ores, silica in the form of fine sand can be largely removed by log washing. The bands of ore which are relatively soft and, on mining, break down into relatively small lumps, contain a certain amount of silica very intimately associated with the iron oxide. This can be readily seen in a thin section under the microscope, occurring as particles a thousandth of an inch in diameter or less. Silica, in this form, cannot be separated commercially from the hematite by mechanical means. Consequently, the grade of concentrates produced by log washing sandy ore or by jigging harder cherty ore will depend almost entirely on the grade of the ore bands or lumps. These in turn depend on the original iron content and on the amount of microscopic silica that has been removed by secondary leaching.

In magnetic ores there is microscopic silica in the ore bands and microscopic particles of magnetite in the gangue bands. Also there are certain silicates of iron in the gangue which are nonmagnetic, and in some localities, such as the western Gogebic, there is a certain proportion of specular hematite. With such material very fine grinding, 300 mesh and finer, will liberate a large proportion of the microscopic particles of gangue, and the microscopic particles of magnetite, which can then be recovered on account of their magnetic attraction. Iron occurring in this material, in the form of silicate or as hematite, naturally will largely be lost in the tailings. In general, with this material it may be said that the possible grade of the product will depend principally on the fineness of grinding.

The success of beneficiating low-grade iron-bearing material will depend not only on the grade of product and the recovery of concentrates that can be made, but on the cost of the finished product. Conditions are still governed by the price of available direct shipping ores, and any beneficiated product must be produced at a cost that will compete on an even basis at the furnace. With the growing scarcity of high-grade ores higher prices will undoubtedly obtain and more expensive beneficiation treatment will be justifiable.

MINERAL OUTPUT OF PERU REACHES NEW HIGH LEVEL UNDER PRESENT DEMAND

Department of Commerce Receives Detailed Report on Mining Conditions in South American Republic—Cerro de Pasco Company, Owned by Americans, Producing Copper at Enormous Rate

The great demand in the United States and the belligerent countries for copper and other minerals acted as a boom to the mining industry of Peru during the year 1915. Mines which previously had been shut down were reopened and large quantities of low-grade ore were handled as a result of the urgent demand and high prices for nearly all Peruvian metals, according to reports to the Department of Commerce from Lima.

The Cerro de Pasco Mining Co., American owned, continues to be the largest copper-producing mine in Peru. It handles about 75 per cent of the total production. The Backus & Johnston Mining Co., which is the second largest, turned out about 6,000 tons of copper during 1915.

The increased tonnage in bars and the decreased tonnage in matte and ores in 1915 is due to the operation of the new Backus & Johnston converting plant which was installed in 1914. About 75 per cent of the copper produced in Peru comes from the Department of Junin and 14 per cent from the adjoining Department of Lima, which mines are chiefly owned or controlled by American capital.

Stimulated by high prices for copper the mining companies increased their outputs, reaping the benefit of previous improvements and facilities. At the end of 1915 it is stated that the Cerro de Pasco Co. was producing copper at the rate of about 6,000,000 pounds per month. This company, which has a New York office, imports large quantities of machinery, tinned foods, lumber, coal, and clothing, mostly from the United States.

HIGH FREIGHT RATES

There were decided fluctuations in the price of standard copper during 1915. The selling price, which is largely regulated by the Liverpool market, was in January, 1915, $281.65 per ton for standard copper. It went up to $391.36 in April, fell in August to $324.83, and closed in December at $410. This latter price was considered at the time very satisfactory. The price paid now for this metal (June, 1916) is, however, around $603 a ton.

From the Callao-Lima consular district the copper exports to the United States during 1915 reached the highest figure in the history of the industry in Peru, amounting to $14,198,799, against $9,297,155 the preceding year.

One of the great drawbacks to the development of this industry was the abnormal freight rates that obtained throughout the year. Not only were the rates between Callao and European and American ports abnormally high, but it was most difficult to procure sufficient cargo space on the limited number of ships plying between these ports.

The shipowners toward the latter part of the year would accept minerals for exportation based only on their value; that is, on copper in sacks with value not exceeding £25 ($121.60) per ton the freight rate was £2 ($9.73) Callao to Liverpool; and on copper valued at £90 to £115 ($438 to $560) per ton the freight was £3 2s. 6d. ($15.56). In February of 1916 the freight on the same mineral increased to £6 15s. ($32.85) a ton. The prevailing rate from Callao to New York on Peruvian minerals during the latter part of 1915 was between $18 and $23 per ton.

On metals valued at more than £100 ($480) per ton a rate of 3 per cent was charged. In February, 1916, this charge went up to 7 per cent, and it was difficult to get sufficient cargo space at that rate. Consequently, producers of low-grade ores and low-priced minerals found it impracticable to ship.

SILVER AND GOLD MINING

Most of the silver exported from Peru forms part of the copper shipments. Only a small portion is mined and shipped separately, as in silver bars for example. It happens in Peru most frequently that silver is found associated with copper and lead, therefore the larger part of it leaves the country in the form of copper bars and mattes and lead bars and lixiviation sulphides.

Silver ranks next in importance to copper and constitutes about one-fourth of the Peruvian mineral production. It owes its position almost entirely to the fact that the Peruvian copper ores are argentiferous and the great output of copper has resulted in a larger silver production. About 81 per cent of the silver of the country comes from two Departments, and from practically the same mines as does the copper.

The Departments of Ancachs, adjacent to Junin on the north, contributes one-tenth of Peru's silver output, chiefly from argentiferous lead ores. This Department has a great number of comparatively small producers, both native and foreign.

The exports of silver to the United States in

1915 in various forms were valued at $724,263.

Although the gold output of Peru has considerably increased in recent years and is valued at nearly $1,000,000 a year, when analyzed the figures show that the gold mining industry as such is of little importance. Less than 40 per cent of the gold production comes from precious metal deposits, gold lodes, and placers. The remainder comes as a by-product from the mining of other ores, chiefly copper, as in the case of silver. In fact, all the copper bars exported from the country are taxable according to the percentage of gold and silver they contain. The Department of Junin takes first rank, with 60 per cent of the gold output. One-half of the entire gold production comes from the copper ores of the Cerro de Pasco mines. Several of the other Andean Departments maintain a small production from gold ores and gold placers. The most important gold mines in recent years are the Chuquitambo near Cerro de Pasco; Cochasayguas in the Department of Apurimac; and the Santo Domingo of the Inca Mining Co., the mines being situated on the eastern slope of the Andes in the Department of Puno. Most of the mines are equipped with modern gold-milling machinery. By the recent law of November, 1915, an export tax of £10 ($48.66) a kilogram is placed on gold.

DEMAND FOR RARE MINERALS

Considerable interest was manifested here throughout the year 1915 in locating and developing properties containing rare minerals, such as tungsten, vanadium, molybdenum, bismuth, and antimony.

The European war has, of course, been responsible for this. The prevading prices are the highest reached in many years and practically all owners of rare minerals have been working their mines to the fullest extent.

Prior to 1910 no tungsten was exported from Peru. In that year 12 tons were shipped. The demand has rapidly grown until at present there are shipments of about 345 tons a year, mostly to the United States and England. During the first three months of 1916, 70 tons of concentrates, running from 58 per cent to 56 per cent WO_3, were exported from the consular district of Salaverry, and it is not improbable, should the demand continue and high prices prevail, that this quantity will be increased. A company in Lima has at present a contract for the delivery of about 30 tons per month.

Tungsten was first discovered here associated with gold in a mine in Lircay, Ayacucho, and later on in considerable quantities in the mountain region of Pelagatos, in the Province of Santiago de Chuco, where there exist today three or four valuable mines. The mineral found in Lircay is tungstate of iron and manganese and that found in the north is principally hubnerite (tungstate of manganese). The rapid increase in the utilization of this mineral in the manufacture of war material and tools has given it an enormous value at the present time. The production for 1916, should the war continue, will probably be at least 50 per cent higher than for the preceding year. The French Government is at present manifesting interest in these mines. Recently Col. Dogny, of the French Army, visited the tungsten-producing regions of Peru in the interest of the factories of Crusot, belonging to Schneider & Co., France. In December of 1915, there were rumors to the effect that large deposits of tungsten were discovered in the Puno region, and samples submitted to the engineers at Lima proved it to be wolframite of very pure quality. Nearly all the tungsten exported at the present time is shipped to the United States.

The three principal mines are owned by Peruvians who have at present a contract for a few months with a German house of Lima, which firm ships this ore largely to a banking firm of New York.

RICH MOLYBDENUM PROPERTIES

It seems that Peru is the only country in the world where vanadium has been found as the principal element of a deposit. The mines at Minasragara, the largest in the country, are the property of the American Vanadium Co. The exports of the mineral for the last five years were as follows: Year 1911, 2,251 tons; 1912, 3,048 tons; 1913 and 1914, exports suspended; 1915, 2,526 tons to the United States. The production is, of course, controlled by the vanadium company, which regulates its output according to its demands. Larger quantities, it is stated, could easily be produced.

There exists a vast zone in the Department of Junin where numerous veins of asphaltite are to be found, which are analogous to the grahamite, gilsonite, and albertite found in the United States, with the peculiarity that nearly all contain vanadium, some having as much as 30 per cent of vanadic acid in their ashes.

For several years it has been known that rich molybdenum properties had been discovered in Peru, but owing to the difficulty and cost of concentrating this mineral by oil, and the inaccessibility of the mines, most of them being situated at an elevation of 14,000 feet, they were not worked until the heavy demand and higher prices were created by the European war. The principal group of mines is found in the region of Ricran and Runtaullo in the Provinces of Jauja and Huancayo, and there are some in the district of Cascas in the Province of Contumaza. It may be safely calculated that no more than 4 tons of this mineral, with 83 per cent of molybdenite, were exported during 1915. It brought as high a price as £700 per ton.

It is the belief here that by the proper exploitation of the granite rocks in certain zones important deposits of molybdenum will be found. The export duty on this mineral, under the new law, is $4.86 per ton, but it is not improbable that when the industry develops the duty will be materially increased.

ANTIMONY MINES ACTIVE

Bismuth is exported in the form of concentrates with 20 per cent contents of the metal. The San Gregario mine in the Cerro de Pasco zone is probably the principal producer, but its production is limited by the fact that it forms

part of the European bismuth trust composed of the refineries of Johnson Mathey & Co., London; the royal foundries at Freiberg and Oberstein in Saxony, and the Deutsche Gold & Silberscheide Anstalt at Frankfurt. It is claimed this mine furnishes about one-twelfth of the world's bismuth supply and could furnish the whole.

The production of bismuth during the last four years was as follows: Year 1911, 24 tons; 1912, 51 tons; 1913, 25 tons; 1914, 81 tons. Official statistics of the exports during the year 1915 are not yet available.

Antimony ores are worked only when the price of the metal reaches exceptionally favorable quotations. From statistics and other data it would appear that, with the exception of a shipment to the United States of 7 tons in 1915, no antimony has been exported from Peru since 1910, when 49 tons were shipped. At present, owing to the high price of these ores, a period of great activity in the working of the mines has set in, especially in the deposits along the railway line to Cuzco. According to information these deposits are very abundant. A curious fact that should be noted is that nearly all the stibnite exported has been shipped to Japan.

NEW MINING LAW

Probably the most far-reaching measure affecting the mining industry of Peru during recent years was the new mining law (copy on file in the Bureau of Foriegn and Domestic Commerce), whereby an export tax was placed on nearly all minerals shipped from the country. This law went into effect on November 14, 1915. The revenue it provides will be derived largely from the important copper-producing mines of the country, which are owned principally by American citizens, and control probably 80 per cent of the copper output. The tax on copper is based on a graduated scale. That is, when the price of standard copper in London is from £60 to £65 ($292 to $316) per ton the export tax will be 15s. ($3.65) per ton of 1,016 kilos (2,240 pounds). Above £65 ($316) the tax will be 2s. (49 cents) additional for every pound sterling increase in price. Not only does this measure seriously affect the exports of copper, but the gold and silver contained in the copper bars exported is also taxable.

Fine gold is taxed at £10 ($48.66) per kilo (2.2 pounds). The gold contained in copper and other metals pays a tax of £2 ($9.73) per kilo.

Silver is subject to a tax of 1s. a kilo when the price in London is quoted at 23½d. (47 cents) a troy ounce; above this price, 2½d. (5 cents) more for each penny increase.

Borates pay an export duty of 2s. (49 cents) per ton.

Petroleum pays a contribution of only 1s. a metric ton. These taxes are required to be paid in drafts on New York or London at ninety days sight. When the tax amounts to less than £40 ($194.66) it may be paid in English gold. The Chamber of Commerce of Lima fixes weekly the value per ton of standard copper and of the troy ounce of silver, being guided by the price quoted by the London Metal Exchange.

In addition to this export law, another measure was passed by Congress which places customs duties on all imports of mining machinery, which heretofore was free of duty. The effect of these measures will undoubtedly be unfavorable to future investments of American capital in the mining industries in Peru.

At the present time (June, 1916) the producers of copper are paying the Government on an average of about £7 ($34) per ton for every ton of standard copper exported from the country.

As a result of these laws the amount of taxes which the Cerro de Pasco Mining Company alone will pay to the Peruvian Government during the year 1916, including the export tax on copper and the gold and silver contained in copper bars, and the import tax on their mining machinery and other materials, will be about $1,000,000. It is however, early to gauge what effect the export duty on copper will have upon the industry. So long as the price of copper keeps up the miner can afford to pay his quota.

BETTER COOPERATION IS URGED BY MR. SCHOLZ

"There can be no greater need for proper cooperation than in such matters as those which came to a focus in the recent railway legislation. On the one side we had an example of a democracy which had gone over to socialism. On the other side, we had a union which had construed cooperation to mean monopoly. In between, there was a breakdown of everything which makes for the dignity and the sacredness of our Government. From this warping of things which in themselves are good, we must be redeemed. The only way out is a newer and better meaning of cooperation." (Extract from address of Carl Scholz at the Mining Congress Convention.)

WORK ON MAJOR METALS MAY BE BEGUN IN COLORADO

To meet a demand for metallurgical work on the major metals, the Bureau of Mines is considering an expansion of its cooperative agreement with the Colorado School of Mines, which will allow the undertaking of this work. Director Manning of the Bureau of Mines is making every effort to proportion the funds at his command so as to permit of this additional work. Since it will necessitate the utilization of the services of a high salaried metallurgist and the use of considerable expensive equipment, the question of ways and means presents a difficulty not easily surmounted.

FARMER GETS MORE AID THAN DOES THE MINING MAN

"An interesting comparison shows that the Federal Government in the present year has donated to the farmers one dollar for every $295 worth of products of the farm. It has donated to mining one dollar for every $1,017 worth of products from the mines." (Extract from address of Van H. Manning at Mining Congress Convention.)

Traffic

Proposed increases of rates on bituminous and cannel coal in carloads from certain points in Pennsylvania to destinations in New York, New England, and in the province of Quebec, have met the approval of the Interstate Commerce Commission. The case is known as I. & S. No. 800. The opinion of the Commission was written by Commissioner McChord. The case is summed up by the commission as follows: "Increased rates on bituminous and cannel coal in carloads from group 2 points in the Freeport district of Pennsylvania on the line of the Bessemer & Lake Erie Railroad Company to destinations in eastern New York, New England, and the province of Quebec, Canada, found to be properly aligned with rates on similar coal from neighboring mines on other lines of railroad to the same destinations. Complaint dismissed and orders of suspension vacated."

In the case of the Alliance Coal & Coke Co. *vs.* the Colorado & Southern Railway Co., the Commission held:

"Rates on nut coal from the Walsenburg district in Colorado to points on the Atchison, Topeka & Santa Fe Railway in Kansas found to be unjustly discriminatory to the extent they exceed by more than 10 cents per ton the rates contemporaneously maintained from the Canon City, Colo., district to the same destinations. Proper relationship prescribed."

An effort to secure a lower minimum weight on coke from Chicago to Tonopah has failed. The Interstate Commerce Commission in a ruling in the case of the Berry Coal & Coke Co. versus the Tonopah & Goldfield Railroad Co. has not found the rate unreasonable or unduly prejudicial.

In the case of the Low Moor Iron Company of Virginia *vs.* the Chesapeake & Ohio Railway Company et al, the Commission ruled:

"Upon petition of the Norfolk & Western Railway Company and the Chesapeake & Ohio Railway Company, divisions of joint rates on pig iron in carloads from certain Virginia furnaces to Baltimore, Philadelphia, New York, and Boston, and other points prescribed."

Opens Washington Office

The military committee of the National Research Council has taken offices in Washington and will have a meeting on the first Tuesday of each month.

Completes Field Work

H. G. Ferguson has completed the field work of a geological study of the Mogollon & Steeple Rock districts of New Mexico.

CHEAP COAL OF OTHER YEARS A CAUSE OF HIGH PRICE NOW

Saturday Evening Post.

Here is an anthracite coal mine. The operator can take out 40 per cent of the coal at a minimum cost a ton—as he used to do twenty-odd years ago. With improved methods, which involve more expensive equipment and a greater mine cost, he can take out 65 per cent of the coal, as at present. The supply of anthracite being strictly limited, so far as known, it is good long-run economy to recover 65 per cent and pay somewhat more a ton.

For many years we got cheap lumber by ruthless slaughter of forests, taking the timber that was easiest to reach and wasting much of the rest. On a long view we could have afforded to pay more for lumber then and conserve the timber supply. Cheap coal was wastefully burned; cheap lumber wastefully used. Many instances might be shown where cheapness that involves waste is not good economy.

Especially where it involves waste of human material. Cheap clothes and sweated labor, cheap articles made by overworked children, are not a good investment. Cheap food and discouraged farm boys do not spell long-run prosperity.

High prices that inspired better methods of distribution might well be a gain. In this matter of coal it has been declared that distribution to consumers in cities costs 50 cents a ton more than it should; which—according to a recent statement by members of the Geological Survey—is more than half of the total return on a ton to all the capital invested in the coal industry, including coal lands, mining machinery, railroads and coal yards.

If these high prices brought about a thorough study of our methods and habits of production, distribution and consumption they would be profitable in the long run.

CHEMICAL COMPOUNDS FOUND NOT TO AID COMBUSTION

Fraud orders may be issued by the Postoffice Department against certain chemical compounds claimed to aid combustion as a result of an examination of these mixtures by the Bureau of Mines. Laboratory tests were made and in addition the mixtures were tried in furnaces and stoves. An analysis of the mixtures in the laboratory developed the fact that they contained no ingredients which possessed any quality that would aid combustion or would have an appreciable effect upon the burning of coal. The claim that these mixtures would save fuel was declared to be absolutely unfounded. The analysis of one of the mixtures as made by the Bureau of Mines, is as follows: NACL, 79.28; $KCLO_3$, 16.34; $KMNO_4$, .20; NA_2SO_4, .78; NA_2CO_3, 1.15; Insoluble earthy matter, 1.57; moisture, .33.

HISTORY OF MINING IN ARIZONA COUNTY AN INTERESTING TALE

Tucson, Ariz., Jan. 18.—Historically, probably the most interesting of all of the mining activities within the State of Arizona are those of Santa Cruz County, inasmuch as it was within this area that the Jesuit fathers founded a chain of missions in the Valley of the Santa Cruz River and farther south into Mexico. According to "La Historia del Nayarit," an account of the "labors of the Society of Jesus in Sempitronial America," which work was written by Fra Ortega, one of that order, Father Eusebia Kino, whose name has been immortalized by his great work, came from the City of Mexico in 1686, and locating, in 1678, a mission at a point about thirty miles south of the present international boundary between the United States and Mexico, he names the mission and the river beside whose banks it stood, one the Mission Dolores and the other Rio Dolores. From that point as a base of operations the devoted missionary established missions at Cocospera, Remedios and Santa Barbara.

In the Santa Cruz Valley, below the Santa Barbara Mission, Fra Kino built four other missions, the first at San Felipe Guevavi, about nine miles northeast of Nogales; another at San Cayetano del Tumagacori, about nineteen miles northwest from the same town; a third at Santiago, the site of which point is not known accurately now, and the fourth at San Xavier del Bac, nine miles south of Tucson. San Xavier has been restored by the Federal Government and is one of the show places of Arizona.

In the vicinity of each mission was a presidio, or military post, with a garrison sufficiently strong for protection of the surrounding region from the marauding Apaches, who occupied regions beyond the San Pedro and the Gila, whence they were wont to make excursions of rapine and ravage into the country of the Pimas and the Papagoes, peaceable Indians occupying these regions, who readily embraced Christianity, coming easily under the domination of the gentle priests. These Indians were tillers of the soil and laborers. From among them were drawn the workers in the mines and on the ranches that the friars and laymen among the Spaniards discovered and exploited. Tubac, on the Santa Cruz, twenty-two miles from Nogales, was the presidio near Tumacacori, and recently there have been unearthed a lot of old rusty 12-pound cannon balls that were no doubt for use in some of the artillery of the garrison. Tucson, which had been the site of an Indian village, was the presidio for protection of the country surrounding.

According to the history of that time, and the records of the mission now preserved in Spain, the friars at Tumacacori discovered and wrought rich silver mines in the Santa Rita Mountains, to the northeast, and in the Atacosa Mountains, on the southwest. The Salero mines and other properties in the Santa Ritas are known to have been operated by the friars, and in places vestiges of their workings are found today. In recent years a party from California having a plat or map with a written description of the location, said to have come from the archives of the old mission, has been searching in the Atascosa Mountains for an abandoned mine that the record which they have tells of having been exploited by the friars. Those operations are established to have been inaugurated very shortly after completion of the mission church and cloister at Tumacacori. in 1688. So there is presented the record of the first mining done on the Pacific Slope of the United States.

The whole story of mining in Santa Cruz County is told in Bulletin 29 of the Arizona State Bureau of Mines, entitled "The Resources of Santa Cruz County," by Allen T. Bird. Copies may be obtained by writing Charles F. Willis, Director, Arizona State Bureau of Mines, Tucson, Arizona.

RADIUM WORK IN COLORADO ENDED—PLANT IS SOLD

Having completed its experimental work on radium in Colorado, the Bureau of Mines and the National Radium Institute have turned over their plant and radium equipment in Denver to the Pittsburgh Radium Company which recently purchased it. For three years the Bureau has been cooperating with the National Radium Institute and a very successful series of experiments has resulted. As was stated specifically at the beginning of the work, agreement was to be for experimentation covering a limited time.

The total production while not yet exactly known during the three years' work was over eight grams of radium metal. This output has been turned over to the Howard A. Kelly Hospital, in Baltimore, and the General Memorial Hospital of New York. Despite frequent statements to the contrary, the managements of these hospitals are enthusiastic over the results they have obtained in the use of radium in the treatment of cancer

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SHORT COURSES FOR MINERS ARE OFFERED IN ARIZONA

Short courses for miners have been undertaken by the University of Arizona.

The object of these courses is to give the working men of the State of Arizona an opportunity to attend the university for a short period in order to get in concentrated form information and training which will enable them to better their own positions, and which will result in more complete and economical utilization of the country's mineral resources, it is stated in the announcement.

Tuition is free to residents of Arizona. Others are charged a tuition fee of $1.00 per course.

The ability to read and write and to work ordinary problems in arithmetic, together with seriousness of purpose, are the only requirements for entrance to these courses. The faculty reserves the right, however, to exclude any whom they believe are insufficiently qualified to benefit by pursuing the courses offered. No course will be given for less than three students.

The courses are as follows:

PROSPECTORS' COURSE

This course covers the elements of blowpipe analysis, mineralogy, petrology (rock study), geology and surveying. The student is taught how to identify all the commoner or more important elements by the use of a blowpipe, and how to recognize the principal ore and gangue minerals and rocks at sight. In geology only those portions of the subject directly applicable to mining or prospecting are presented; while in surveying, the work covers the use of instruments, mapping, computing connections, etc. Incidental fee, $5.00.

FIELD GEOLOGY COURSE

This course gives practice in the application of geological theory in the field and in the solution of the geological problems arising in mining operations. Some training is given in the construction of geological maps and sections, and several mineralized areas in the neighborhood of Tucson are carefully studied. Students desirous of taking this course should correspond with the university before coming to Tucson, as it may prove impossible to give this course in 1916. Incidental fee, $1.00.

ASSAYING COURSE

This course includes the theory and practice of assaying for gold, silver and copper. Among the topics presented are the use of apparatus, reagents, methods of sampling and the assay of solutions and bullion. Fire assaying for lead is also briefly presented. The work is carried on largely in the laboratory, and is intended to teach the routine work of mine assay offices rather than to enable the student to solve the varied problems that are constantly encountered by a public assayer. Incidental fee, $1.00.

METALLURGISTS' COURSE

This course deals with concentration and amalgamation, and includes practice work in mill and laboratory, as well as theoretical instruction. Among the subjects presented are the following:

Concentration, hand dressing, crushing, stamping, screening, classification, sand and slime concentration and magnetic separation.

The chemistry of the cyanide process, testing for cyanide treatment, precipitation of cyanide solutions, cleaning up and refining bullion.

Amalgamation, testing for amalgamation, cleaning up and retorting.

BUREAU OF MINES ESTABLISHES STATION AT NORTON, VIRGINIA

In order to serve the important mining region of which Norton, Va., is the center, the Bureau of Mines has decided to establish a mine rescue and first aid station at that point. D. J. Parker, the mine safety engineer of the Bureau of Mines, and E. B. Sutton, the Bureau's engineer having charge of the southeastern district, have visited Norton and have arranged for cooperation with the operators.

CAR SHORTAGE RETARDS COAL SHIPMENTS FROM VIRGINIA

Mining of bituminous coal continues on a favorable basis, but shipments are being retarded by continued car shortage, says the report to the Federal Reserve Board from its bank in Richmond. The manufacture of fire brick in some of the coal regions is on an unusually good basis. Port shipments of coal continue to show a decrease. Prices are firm, with a scarcity of freight room and a continuance of high rates.

POLISHING OF MINERAL SPECIMENS FAIRLY SIMPLE

The polishing of rocks and mineral specimens for ordinary purposes is fairly simple. It is only necessary to grind a flat face with coarse carborundum or emery, gradually remove all irregularities and scratches with finer carborundum, and finally polish on any revolving disk covered with leather, broadcloth, felt, beaver cloth, or other cloth, kept wet and dusted with polishing powder. Tin oxide (putty powder), chromic oxide, aluminum oxide, and iron oxide (rouge) are the most suitable polishing powders. Instead of using a revolving disk the polishing can be done by hand on any flat surface.

For methods of obtaining the high polish required for examining opaque minerals with the reflection microscope complete information is given in "The Microscopic Examination of Opaque Minerals," by Joseph Murdoch, recently published by John Wiley and Sons.

Personals

Charles W. Henderson, who is in charge of the Denver office of the Mineral Resources Division of the Geological Survey, is in Washington conferring with H. D. McCaskey, the chief of the Mineral Resources Division.

John Huff, of the Bureau of Mines, has been assigned to the Seattle Experiment Station, where he will have charge of an important division of the clerical work.

Fred T. Roseberry, of Sycamore, Cal., has advised friends in Washington that he will soon leave for Guatemala to take charge of an extensive placer mining operation.

Dr. Henry Mace Payne was in Washington recently on business with the United States Geological Survey. Dr. Payne came through in his car from New York en route to Waynesboro, Pa., on a business trip. While in Washington, he took occasion to call at the headquarters of the Mining Congress.

William Griffith, the well-known mining engineer of Scranton, Pa., spent several days in Washington recently.

John P. Reese has been elected vice-president and general manager of the Consolidated Coal Mining Company, with headquarters at Gillespie, Ill.

Prof. Arthur K. Adams has gone to Chile in the interest of the Andes Copper Mining Co. Professor Adams expects to be in South America for a considerable time.

H. G. James, president of the Western Petroleum Refiners' Association, with Mrs. James, has left on an extended trip to Honolulu.

James F. Callbreath has returned to the Washington office after a trip to Denver where he attended the Colorado Metal Miners' Association meeting. En route, he stopped at Chicago where he looked after the printing of the proceedings of the recent convention held in Chicago.

George Otis Smith, Director of the United States Geological Survey, read a paper on "Geology and Public Service" before the Geological Society of Washington, January 10.

Charles T. Lupton, formerly with the Geological Survey, but who is now connected with the Cosden Oil & Gas Co., has been working at the Geological Survey during the past month completing some of his reports.

Harry L. Day, of Wallace, Idaho, has been spending a few days in the East. Mr. Day is a director of the American Mining Congress, and while in Washington discussed with Secretary Callbreath the work of the organization.

Clarence G. Smith of the Bureau of Mines has in preparation a bulletin on "Petroleum Accounting Methods."

Van H. Manning, Director of the Bureau of Mines, was ill during a portion of last month with an attack of lagrippe.

John Cochrane, head of the publications division of the Bureau of Mines, was in Pittsburgh several days last month to arrange plans for the dedication of the Bureau of Mines building there.

GEOLOGICAL STUDY OF OATMAN DISTRICT TO BEGIN NEXT FALL

Until topographical maps can be completed, it will be impossible to make a geological study of the Oatman mining district of New Mexico. It had been hoped to have these maps ready so the geological work could be done this winter. Unexpected difficulties in the detailed work on the maps have come up, however, and it will be necessary to work until next fall for the geological study. Adolph Knopf, the geologist who had been designated to do the Oatman work, has been assigned to a similar study of the Rochester district of Nevada.

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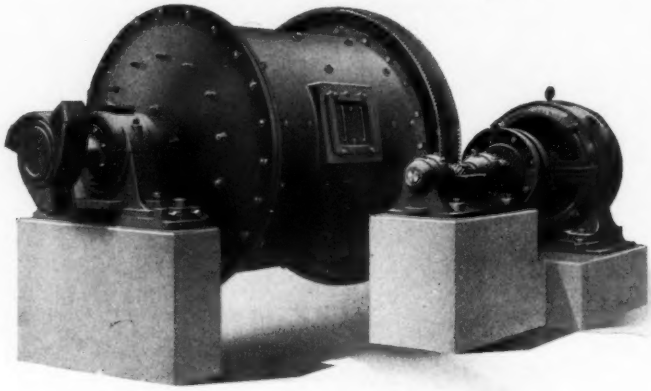

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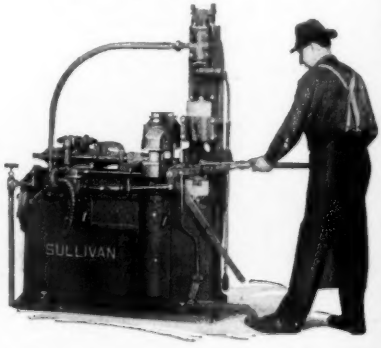

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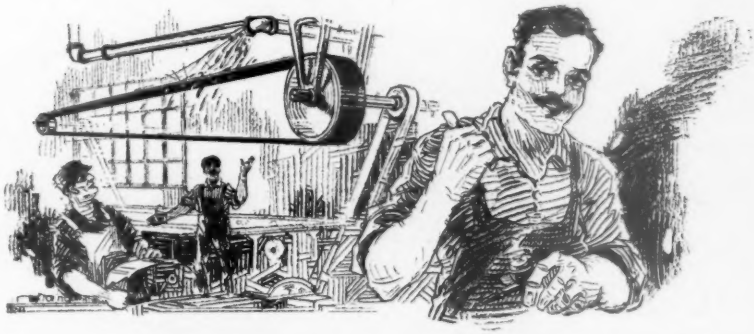

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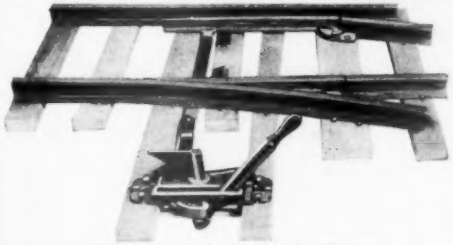

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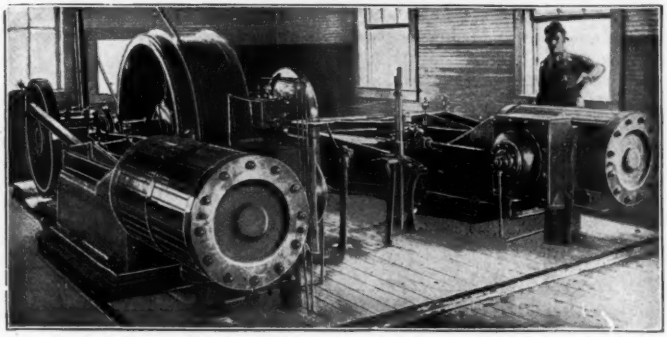

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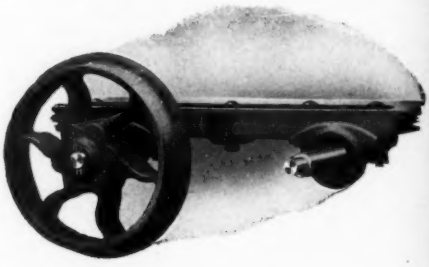

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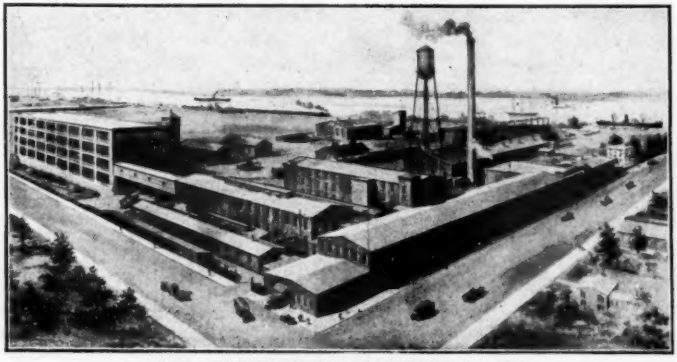

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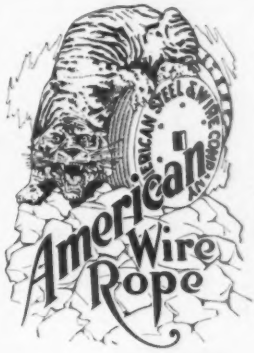

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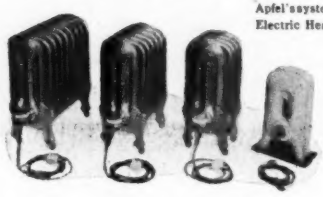

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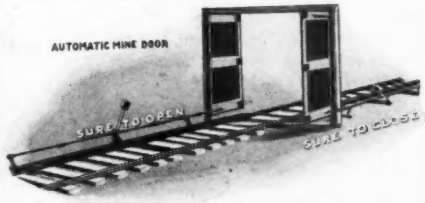

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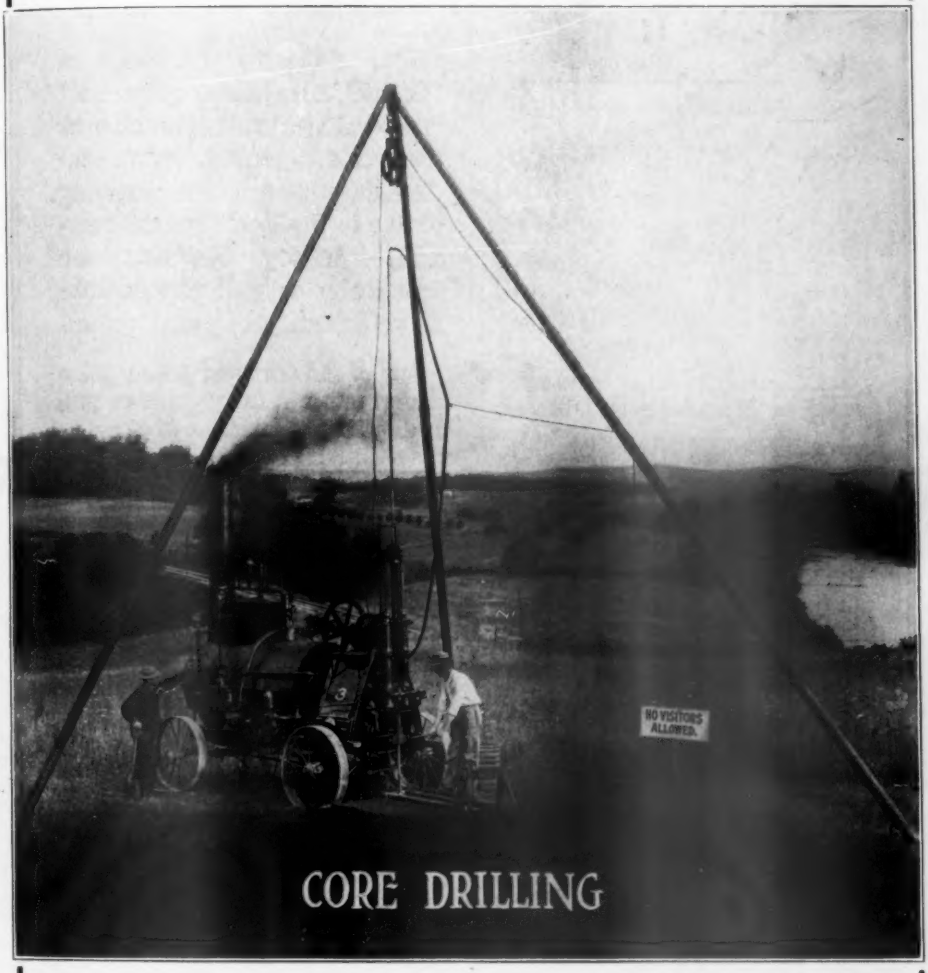

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